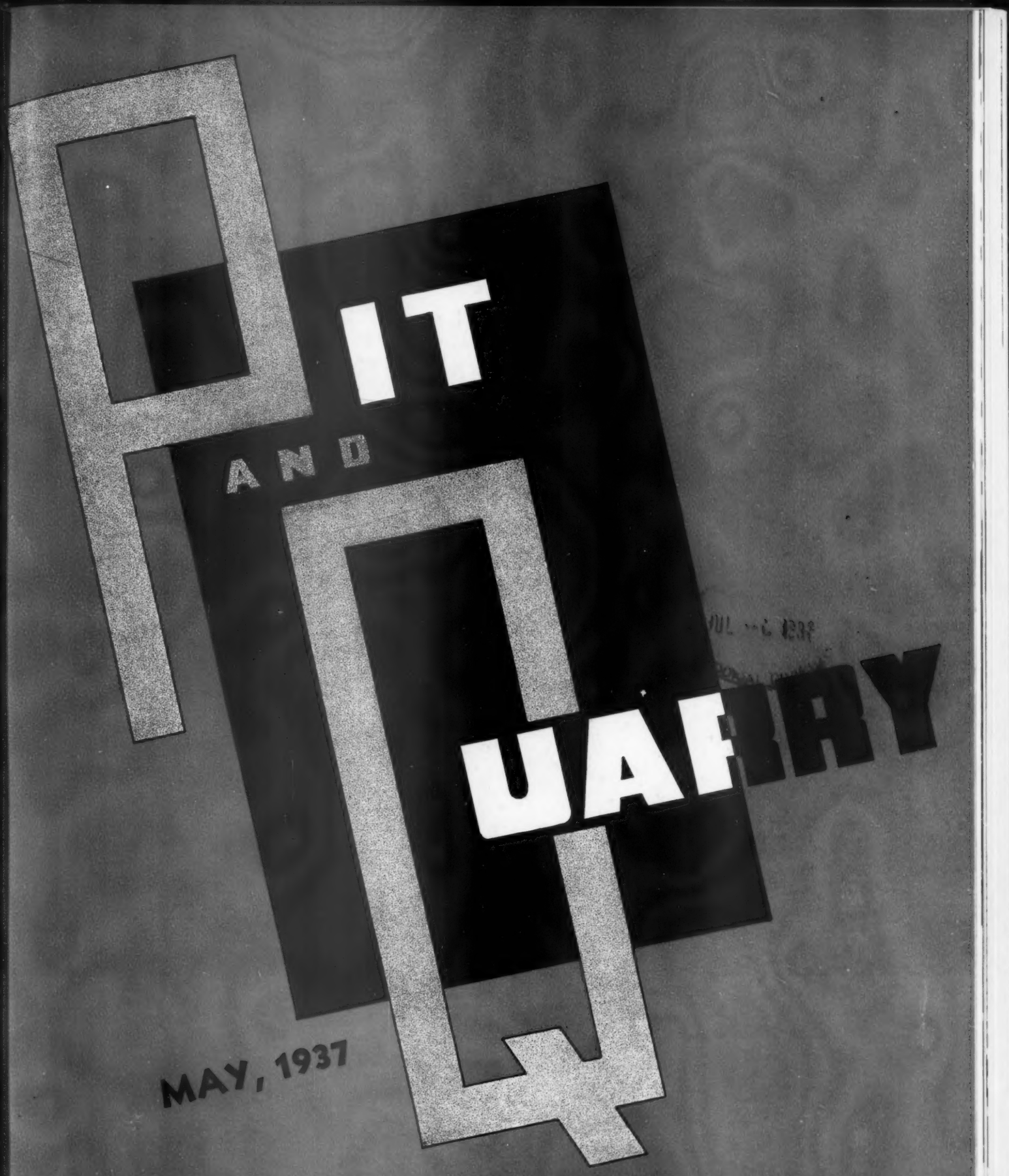
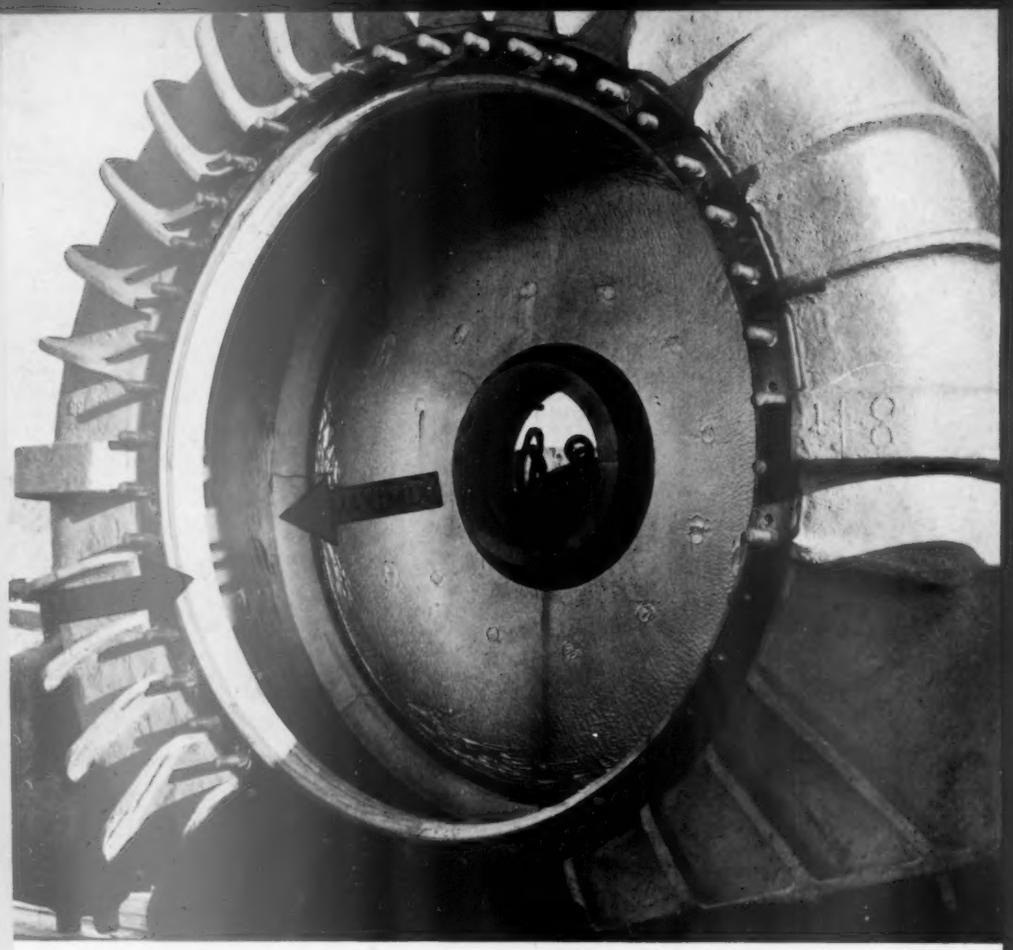
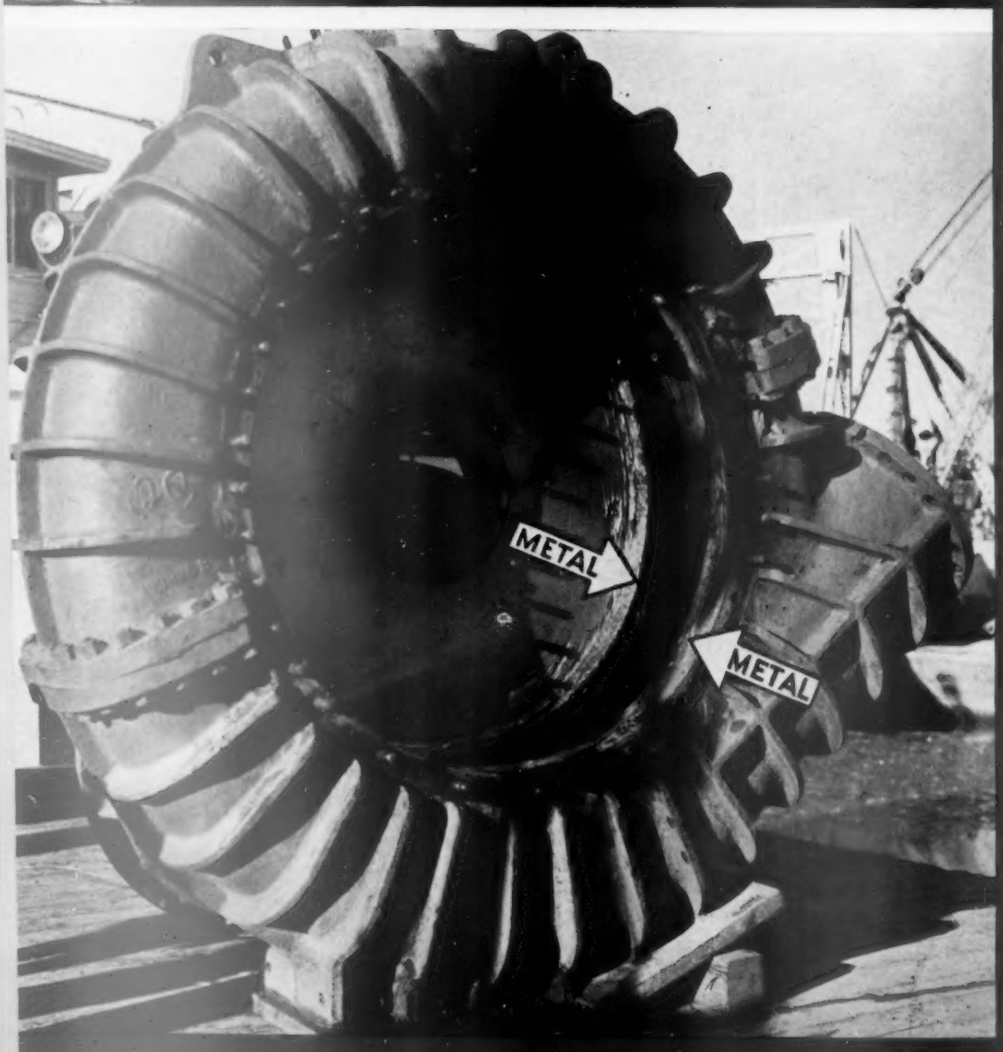


400-Ft. Rotary Lime Kiln . . . Surplus Aggregate Yields Profit . . . Dry Ice from Carbon-Dioxide Gas . . . I.A.T.M. Congress . . . National Gypsum Modernizes Akron Plant





Comparison of MAXIMIX RUBBER with METAL after Pumping 1,200,000 yd

Two pumps in the same line, one pump w Maximix Rubber Parts and the other w similar parts of the hardest, practical all steel. Both pumps handled 1,200,0 yards of the same material. Maxim Rubber (indicated by colored arrows) sho practically no wear, while the equival metal parts (indicated by white arro are worn to the extent that they requ replacement with new "more-expensiv than-rubber" parts . . . The side plate lin and other parts of the Hydroseal Dredg Pump are moulded of Maximix Rubb which generally outlasts metal three to f times. The Hydroseal Principle of introdu ing clear water on each side of the impe ler invariably saves 35% in pumping pow costs. Address the nearest office listed b low for a copy of new Catalog No. 3-83

HYDRO SEAL

Dredge Pump *MAXIMIX* Protect

PRINT IN BL

FOR FORT PECK DAM

● The top picture shows some of the many piles formed by reject material (sand) from two Link-Belt traveling preparation plants, owned and operated by the Becker County-Shiely Co., Cole, Mont. The circle insert shows one of these plants.

They produce "toe" or bottom gravel for the slope of this earth-filled dam. Prepared material is loaded into railroad cars for delivery to the dam.

The stationary plant shown in the background (upper illustration) was also designed and built by Link-Belt for J. L. Shiely Co., Cole, Mont., and produces washed and screened sand and gravel for concrete tunnel lining, retaining walls, spill-ways, etc.

Send for Book No. 1240, "Equipment for Preparing Sand, Gravel, Stone, by Link-Belt."

Link-Belt Company, Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any of our other offices in principal cities. 6042

THE SYMBOL OF QUALITY
LB
LINK-BELT

LINK-BELT

Equipment for Preparing Sand, Gravel, Stone ✓

PIT AND QUARRY, May, 1937. Vol. 29, No. 10. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price: $2 for 3 years, $1 for 1 year in the U. S. and possessions, Canada and Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter November 28, 1932, at the Post-Office at Chicago, Ill., under the Act of March 3, 1879.

T IN BINDING

DO YOU KNOW...

A half century ago Jeffrey originated and patented certain fundamental chain designs. From these were manufactured the first all steel drive and conveyor chains with rollers turning on thimbles locked in the side bars and with pins articulating in the thimbles. For this original invention the U. S. Patent Office on November 29, 1887, granted Patent No. 373,983 on "Chain and Chain-Making" . . . to Joseph Andrew Jeffrey, founder of the Jeffrey Manufacturing Company.

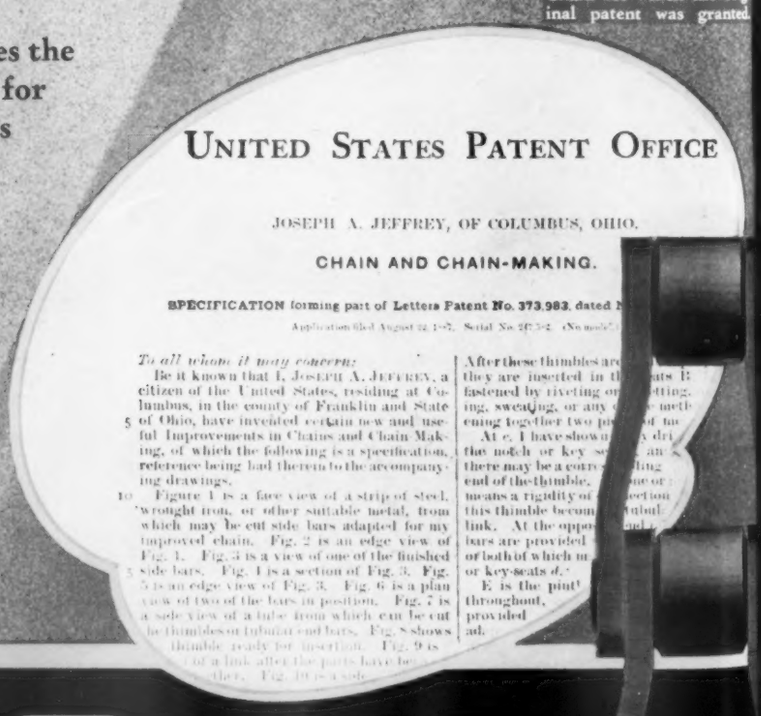
These chains, which Jeffrey expressively names the STEEL THIMBLE ROLLER type . . . STR for short . . . have survived the tremendous changes in power transmission and conveying ideas of industry during the past 50 years. Maximum strength and minimum weight, with renewable parts make their use a real economy.

When you have need for such chains . . . call on Jeffrey, their originator.

The Jeffrey Mfg. Co.

Columbus, Ohio
Sales Offices in Principal Cities

Reproduced below is the Steel Thimble Roller Chain for which the original patent was granted.



UNITED STATES PATENT OFFICE

JOSEPH A. JEFFREY, OF COLUMBUS, OHIO.

CHAIN AND CHAIN-MAKING.

SPECIFICATION forming part of Letters Patent No. 373,983, dated N

Application filed August 12, 1[illegible]. Serial No. 247,342. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. JEFFREY, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Chains and Chain Making, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a face view of a strip of steel, wrought iron, or other suitable metal, from which may be cut side bars adapted for my improved chain. Fig. 2 is an edge view of Fig. 1. Fig. 3 is a view of one of the finished side bars. Fig. 4 is a section of Fig. 3. Fig. 5 is an edge view of Fig. 3. Fig. 6 is a plan view of two of the bars in position. Fig. 7 is a side view of a tube from which can be cut the thimbles or tubular end bars. Fig. 8 shows a thimble ready for insertion. Fig. 9 is [illegible] of a link after the parts have been [illegible] ther. Fig. 10 is a side

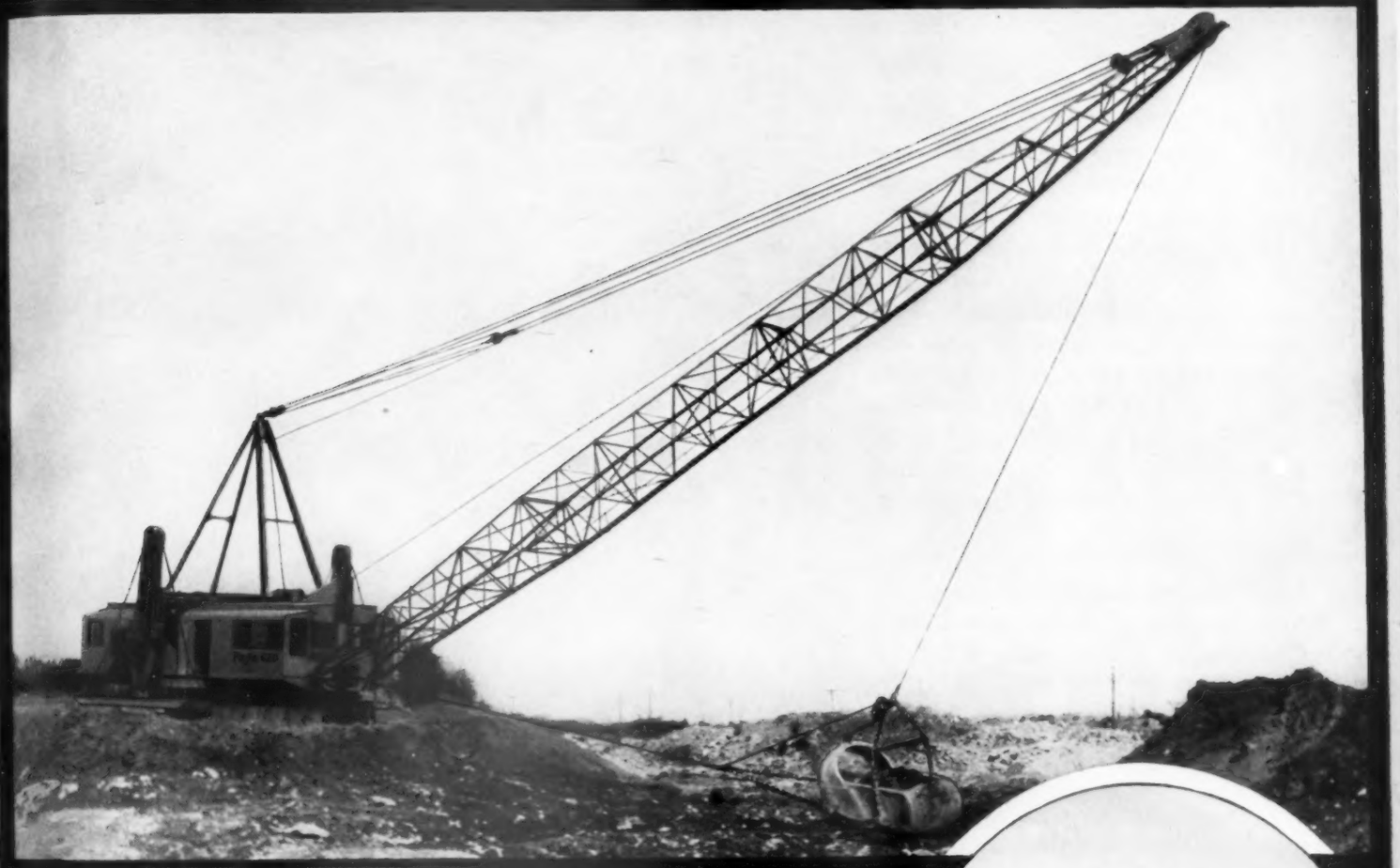
After these thimbles are [illegible] they are inserted in the [illegible] fastened by riveting or [illegible] ing, swedging, or any [illegible] ening together two pi[illegible] of the

At *e*, I have shown a [illegible] the notch or key se[illegible] there may be a corre[illegible] end of the thimble. [illegible] means a rigidity of [illegible] this thimble becom[illegible] link. At the oppo[illegible] bars are provided [illegible] of both of which m[illegible] or key-seats *d*.

E is the pin[illegible] throughout, [illegible] provided [illegible] ad.

PRINT IN

Page High Yardage WALKING DRAGLINE



...oderately Priced—Three to Five ...ard Machines Immediately Available

Diesel powered—by a heavy duty horizontal engine designed particularly for dragline use.

High—load—hoist—and swing speeds.

Large circular base. Machine can work on the softest ground without mats or danger of miring down.

Fairlead, drums, and sheaves designed to reduce cable wear.

Simple positive crank action walking mechanism, moves machine on the softest ground, walks immediately in any direction three steps per minute. Reduces machine's original cost.

Before buying any dragline, learn what the Page Walker can do on your job! For information write—

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PAGE ENGINEERING COMPANY
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Please send information on a Page "600" Walker. Size _____

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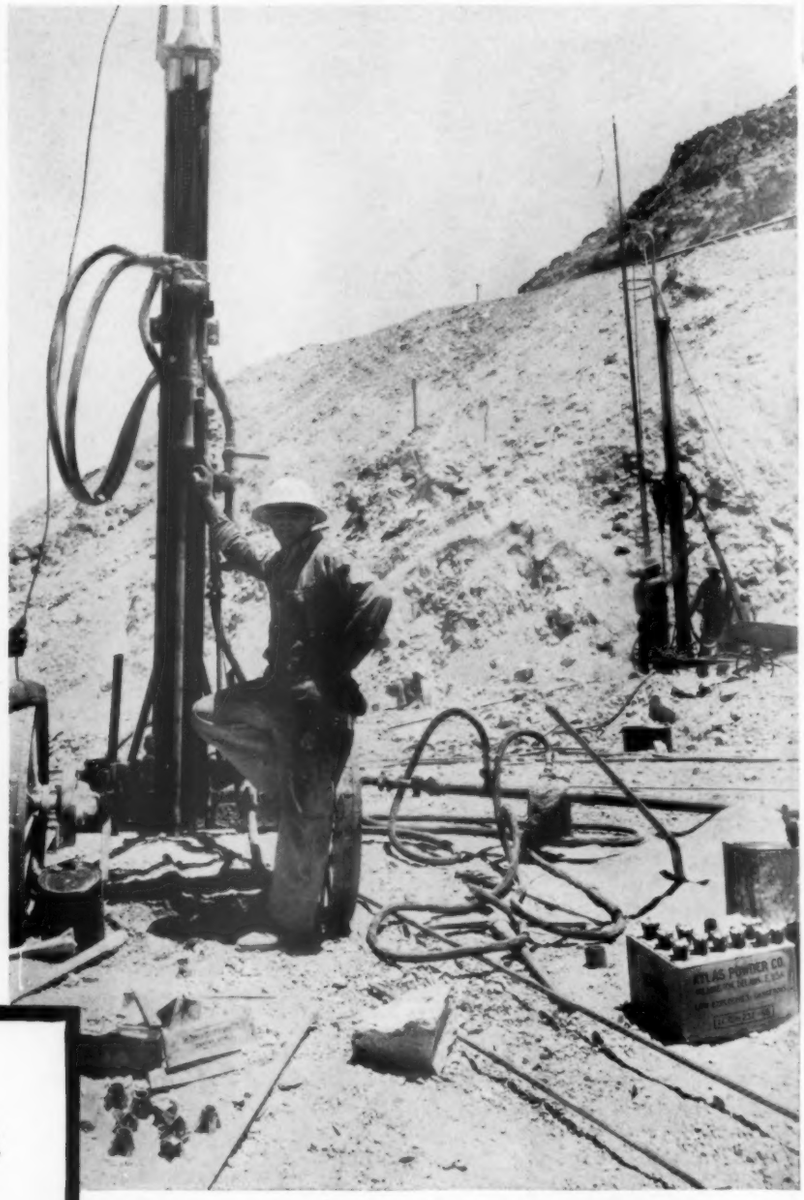
NT IN BINDING

6 OUT OF 7 WAGON DRILLS ON THE ALL AMERICAN CANAL ARE *Clevelands*

IN the rock cuts along the All American, six out of seven wagon drills are Clevelands. Selected because they drill faster, blow the holes better, and are so much more adaptable and so much easier to handle, Cleveland Drill Rigs have had an important part in excavating this big ditch that will furnish water for irrigating a million acres of fertile soil in the Imperial and Coachella Valleys of California.

The rock contractors on this immense project saved plenty of time and money by specifying Cleveland DR6 and WDA-10 Drill Rigs for the 30 to 40 foot holes it was necessary to put down in the hard, ravelly, rock along the canal right-of-way. Let their selection of drilling equipment guide and help you in procuring drills for your own rock jobs. Bulletins 109 and 111 sent on request.



The cut in which this picture was taken necessitated the removal of nearly 600,000 cubic yards of hard rock. Two Cleveland Drill Rigs did all the primary drilling.

BRANCH OFFICES

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THE CLEVELAND ROCK DRILL COMPANY

3734 EAST 78TH STREET • CLEVELAND, OHIO

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LEADERS IN DRILLING EQUIPMENT

TRAYLOR

SCORES AGAIN with a 400 foot ROTARY LIME KILN

Traylor-Cheesman Double-Tube Burner installed at the firing end of the 8'6" x 400'-0" kiln.

5'-6" x 42'-0" Traylor-Cheesman Multipe-Tube Rotary Cooler.

The longest of the rotary lime kilns to go into service up to this time, the Traylor 400'-0" all welded kiln, recently installed at the new plant of the Chemical Lime Company, Bellefonte, Pa., is a tribute to Traylor engineering skill. It is operated in conjunction with a Traylor-Cheesman Double-Tube Burner for accurate control of combustion through its entire length, and the burner uses pre-heated air reclaimed from the burned lime by a Traylor-Cheesman Multiple-Tube Rotary Cooler. The combination assures high capacity, high efficiency and a high quality of product.

TRAYLOR ENGINEERING & MANUFACTURING CO.

ALLENTOWN, PENNSYLVANIA, U. S. A.

NEW YORK CITY — CHICAGO — SALT LAKE CITY — LOS ANGELES — SEATTLE

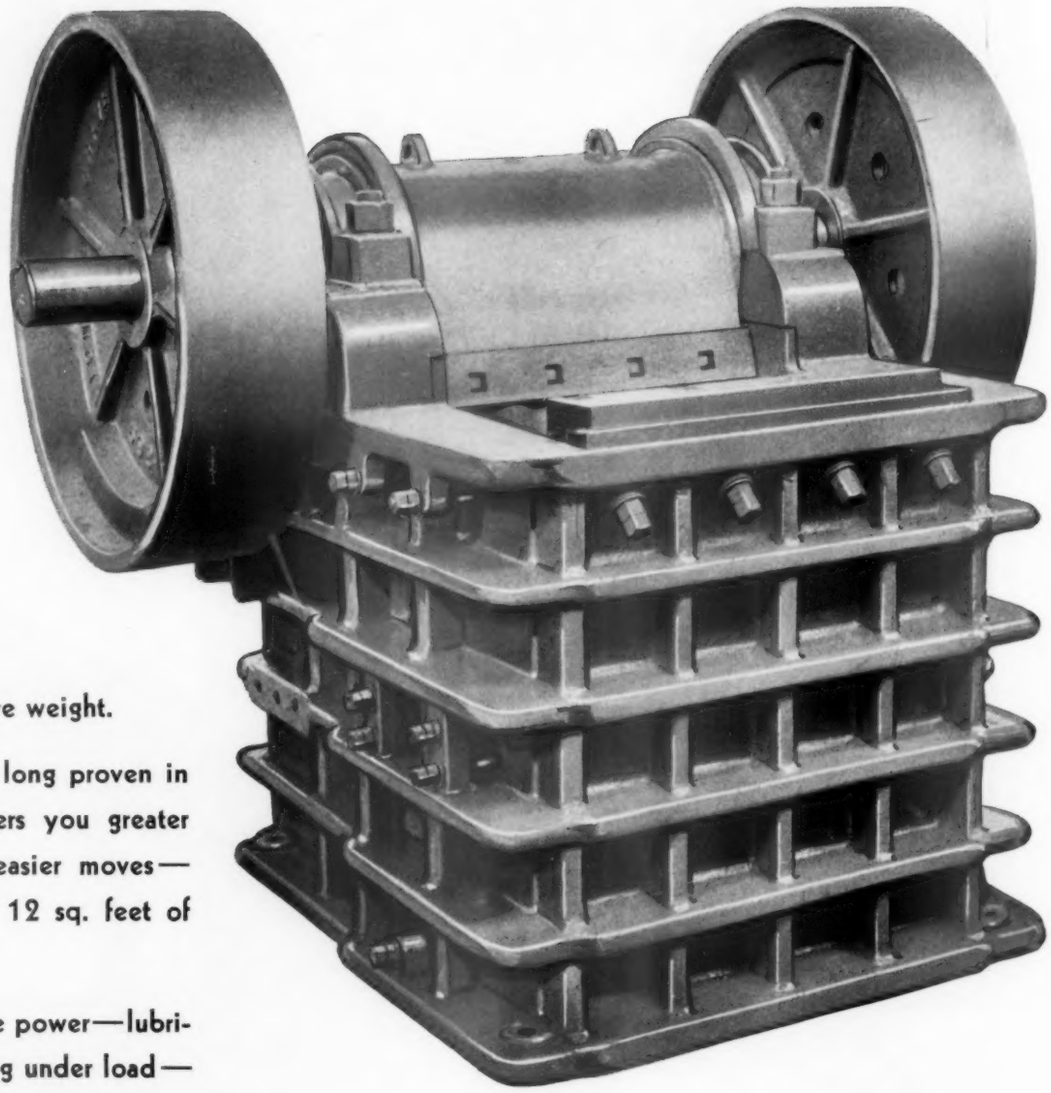
THE PIONEER 24–36 PRIMARY BREAKER

–A BIG CRUSHER

24″x36″ Opening

–A HUSKY CRUSHER

–yet light in weight– only 16 tons



– electric steel castings save weight.

– the overhead eccentric, long proven in smaller Crushers, now offers you greater capacity, less bulk, and easier moves— long jaws (48″) give you 12 sq. feet of crushing area—

– SKF Bearings—that save power—lubrication—and permit starting under load—mechanical adjustment—without stopping the Crusher . . . all yours in the NEW PIONEER 2436 PRIMARY JAW CRUSHER.

PIONEER
GRAVEL EQUIPMENT MFG. COMPANY

MINNEAPOLIS · MINNESOTA

Try this on your JAW CRUSHER

IF YOU BUY BELTING on the basis of performance rather than theory we think you'll find the following case history interesting.

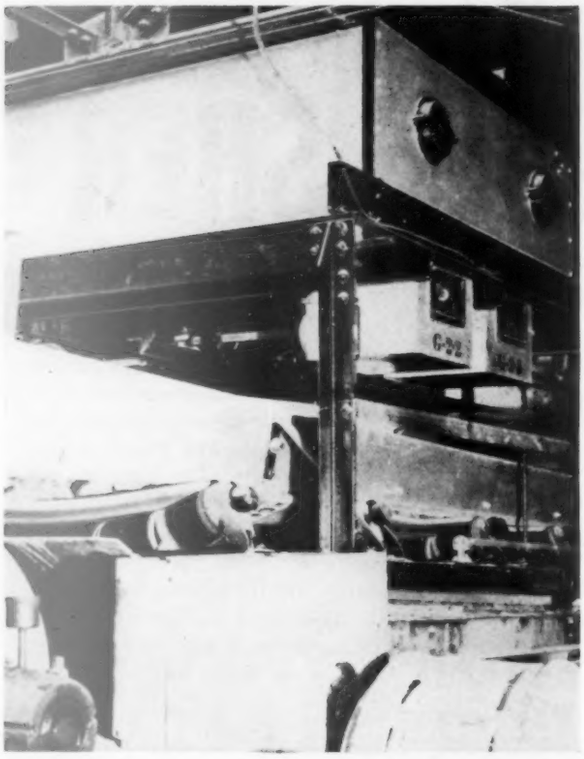
THE FIRST TWO BELTS used on this jaw crusher drive in a Michigan mining operation were a standard heavy duty construction and together gave a combined total of five years' service—which is not bad considering the dust condition and heavy shock load.

THEN THE G.T.M.—Goodyear Technical Man—was called in, and on his specification a Goodyear COMPASS "40" Belt, 28'10" x 12" endless, was applied on November 10, 1931.

TODAY, FIVE AND ONE-HALF YEARS LATER, the Goodyear COMPASS is still pulling this drive satisfactorily—considerably worn to be sure—but still good for several months. Some time ago a replacement COMPASS was bought but so far it has not been necessary to apply it.

FIGURE IT OUT FOR YOURSELF, which is the most economical—two belts in five years or a Goodyear COMPASS that isn't through at 5½ years? Let the G.T.M. show you why COMPASS' patented endless rope-cord construction gives so much longer wear. Just write Goodyear, Akron, Ohio, or Los Angeles, California—OR THE NEAREST GOODYEAR MECHANICAL RUBBER GOODS DISTRIBUTOR.

Largest Crushed Stone Plant on This Continent USES 16



MERRICK CONVEYOR WEIGHTOMETERS

The Michigan Limestone and Chemical Company, operating one of the most modern and efficient plants in existence and employing all practical methods for the economical production of high grade products, depends upon sixteen Merrick Conveyor Weightometers for an accurate check of material handled.

A recent test of the accuracy of Merrick scales was provided when the Pennsylvania, Baltimore and Ohio, and Erie railroads reweighed shipments from this plant totalling nearly a million tons. The plant weightometers had been 99.98% correct. Records like this are significant when you realize the stone is loaded at a rate of 1000 to 3600 tons per hour.

The Merrick Conveyor Weightometer automatically records the weight of any material, as it moves along. The scale is always on the job, giving an accurate, honest weight. Write for details.

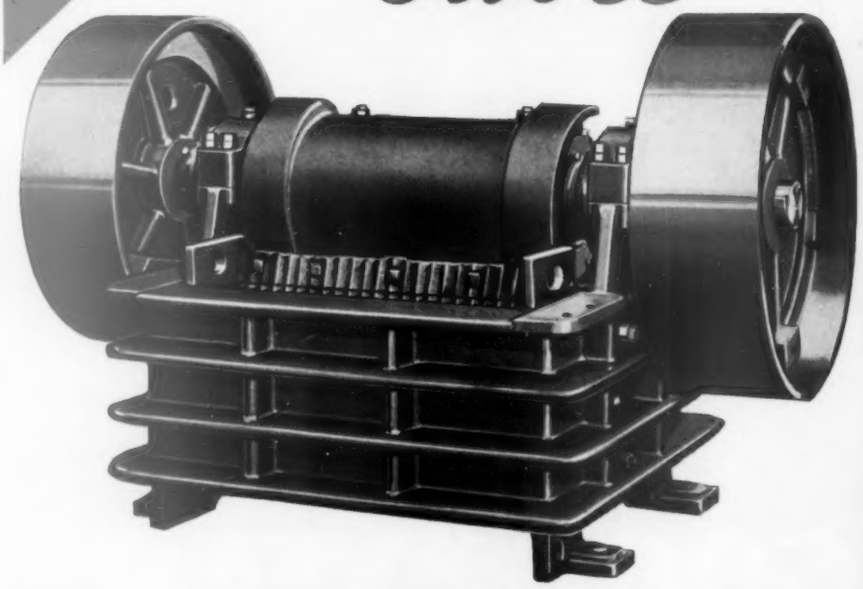
Merrick Scale Manufacturing Co.
186 Autumn Street, Passaic, New Jersey

MERRICK SCALE MFG. CO. PASSAIC, NEW JERSEY

MERRICK CONVEYOR WEIGHTOMETER

A DIAMOND *Roller Bearing* CRUSHER *Saves* —

DIAMOND IRON WORKS INC.



HORSEPOWER:

Power tests with electrical measuring instruments prove Diamond Crushers, under identical conditions, operate with 30% less power than the ordinary plain bearing type requires.

OIL:

The roller bearings are sealed in grease before leaving the factory and require about two pounds of grease a week. This represents a considerable saving over the large amount of oil used every day by plain bearings.

MAINTAINANCE:

The manufacturer of the bearings used in the Diamond Crusher guarantees the bearings for a minimum number of working hours which averages about two years. This guarantee is based on 25% of expected life.

A DIAMOND DEALER NEAR YOU

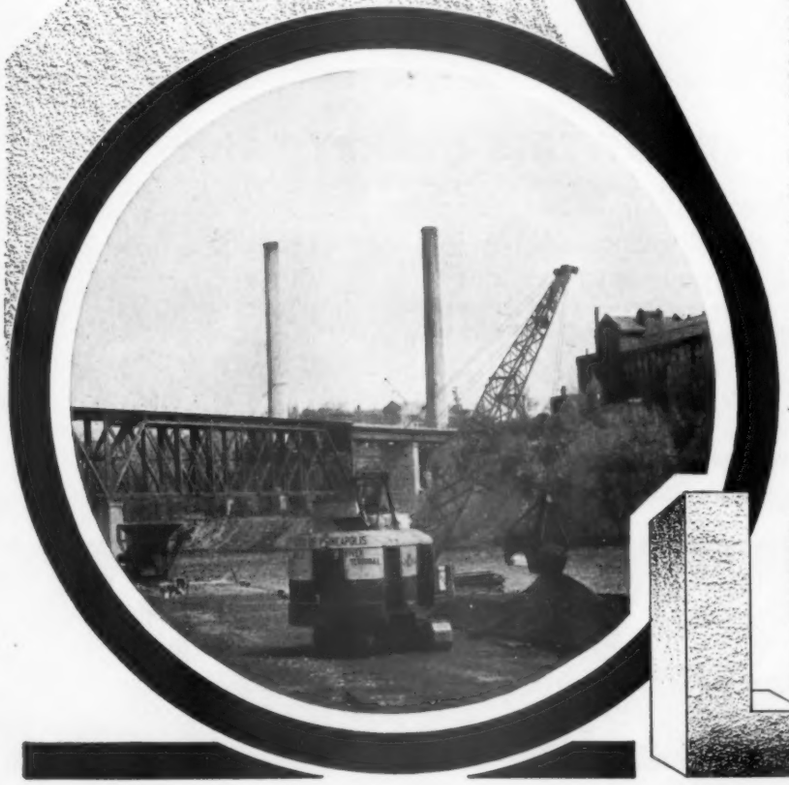
ESTABLISHED 1882

DIAMOND IRON WORKS INC.
MINNEAPOLIS, MINNESOTA

A NEW NOTE IN CRAWLER CRANE DESIGN

SWING, HOIST, TRAVEL, BOOM UP OR DOWN AT THE SAME TIME

follow the trend



A new note in crawler crane design has been sounded by **LIMA**. It is now possible to have a machine with which all major operations can be accomplished simultaneously. Hoist, swing, travel and boom up or down at the same time, is a feature of great importance to contractors who handle a wide variety of work. If your job is confined to space limitations it is certain that it can be handled quicker and better with a **LIMA**. **LIMAS** independent clutch control plus scores of other exclusive features are your assurance of more profitable and efficient crane operation.

Write for a copy of bulletin No. 3.

LIMA LOCOMOTIVE WORKS, Incorporated
SHOVEL and CRANE DIVISION LIMA, OHIO, U. S. A.

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LIMA

HOW "NITRAMON" SAVES DOLLARS

16,359 LBS. OF "NITRAMON" LOADED IN TWELVE 9-INCH HOLES, FROM 76 FEET DEPTH TO 93 FEET, TO PRODUCE APPROXIMATELY 55,000 TONS OF STONE.

THE SUPERINTENDENT OF THIS QUARRY SAID:

"We netted an approximate saving of $120 by using 'Nitramon'.

"The 16,300 pounds of 'Nitramon' did a job that probably would have required 18,500 pounds of dynamite.

"The estimated cost of 'Nitramon'—Primers and Cordeau . . .	$1,850
"The estimated cost of Dynamite—Cordeau	1,970
"Our net saving was	$120

DU PONT
REG. U. S. PAT. OFF.

E. I. DU PONT DE NEMOURS & CO., INC.,
EXPLOSIVES DEPARTMENT, WILMINGTON, DELAWARE

NITRAMON

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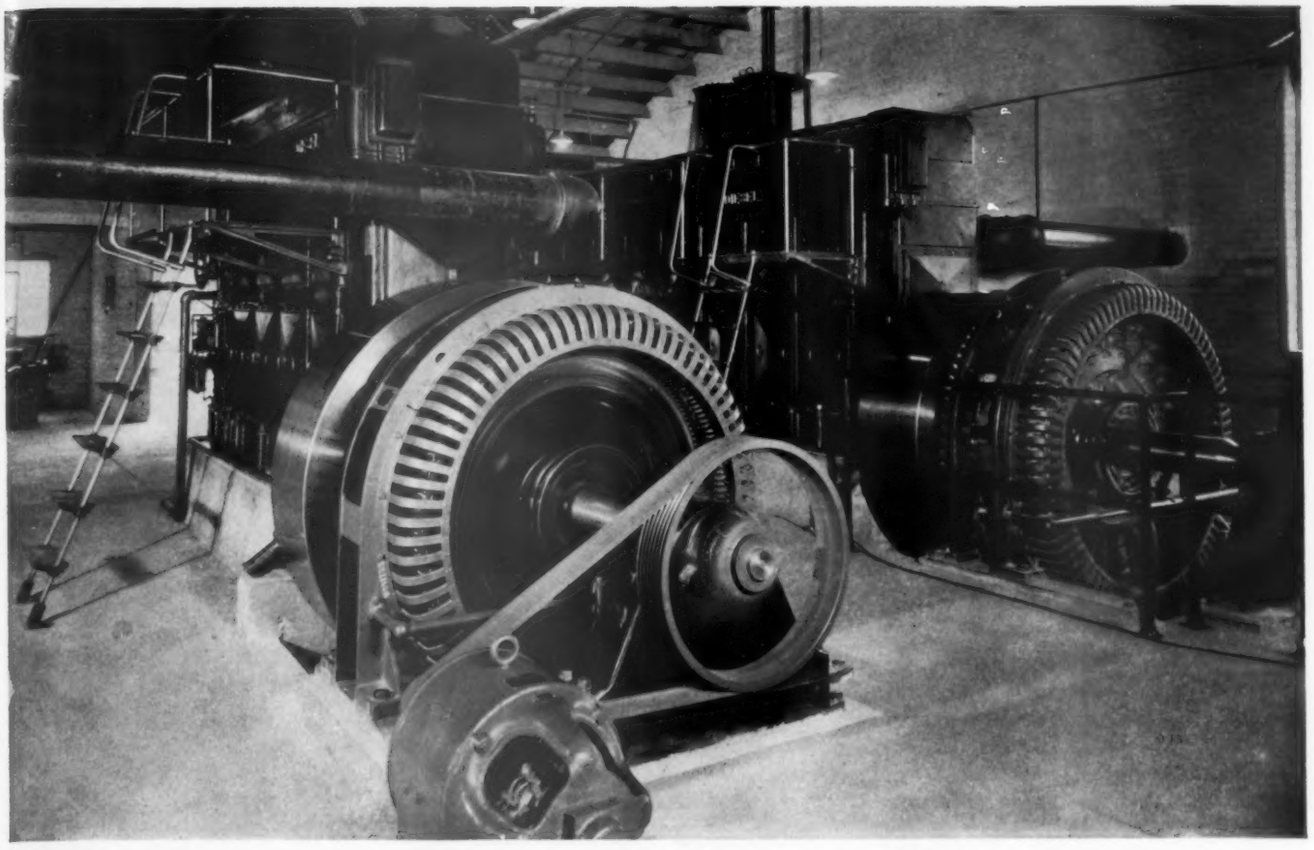
THE APPROVED BLASTING MATERIAL



DIESEL OPERATING COST IS LOW IN QUARRY AND CRUSHING PLANTS

Superior Diesels are the answer to the power problem in many quarries and rock crushing plants where power represents one of the major costs of production.

A typical example is this plant of St. Genevieve Lime and Quarry Company at Mosher, Missouri, where two Superior Diesels of 750 and 375 horsepower are producing power for 7.23 mills per K.W.H. and showing a saving in "out of the pocket expense" of over $900 every month. A third Superior Diesel of 180 horsepower is now being added to this plant for air compressor drive.

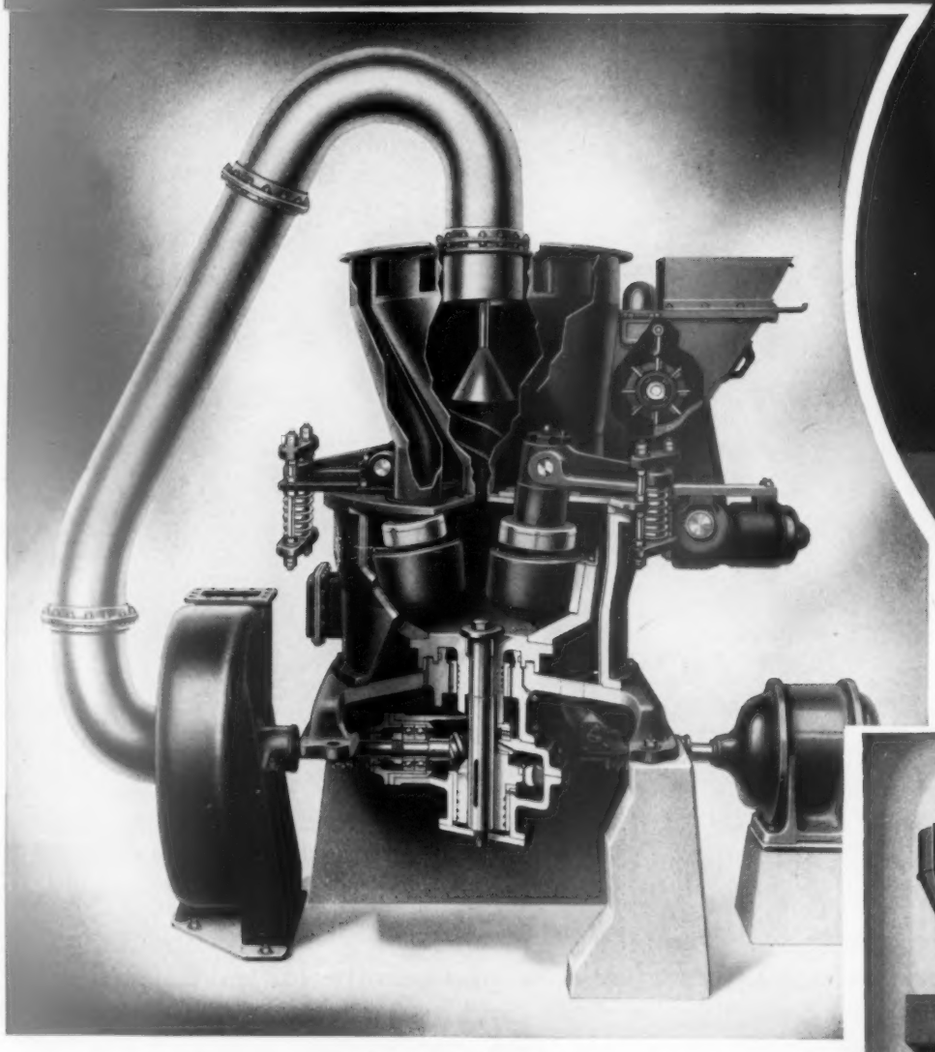
A free power survey may show equal or greater opportunity for savings in your plant—and how this may be realized without large cash outlay. Ask us for details. Large or small Superior Diesels are available for any size plant.

THE NATIONAL SUPPLY COMPANY
OF DELAWARE
SUPERIOR ENGINE DIVISION
LOS ANGELES, CALIFORNIA SPRINGFIELD, OHIO PHILADELPHIA, PA.

Superior DIESELS

HEAVY DUTY MODELS: 50 to 810 H.P., 250 to 720 R.P.M. • HIGH SPEED MODELS: 25 to 150 H.P., 1200 to 1800 R.P.M.

Attention

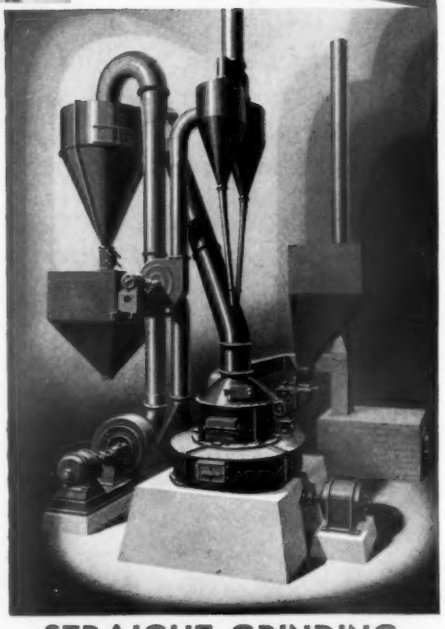


1887
1937

THE TALK OF THE INDUSTRY RAYMOND Bowl Mill for direct firing rotary lime kilns . . . sensational record of performance . . . typical installation raised lime-to-coal ratio from 2¼ : 1 to more than 3 : 1 besides using cheaper grade of coal and showing a 50% saving in labor.

RAYMOND engineers have specialized in lime products *grinding and separating* operations. They have developed new and better methods which have greatly advanced modern practice. If you have a production problem, Raymond engineers will cooperate with you in working out a practical and economical solution.

LIME EXPERTS



STRAIGHT GRINDING

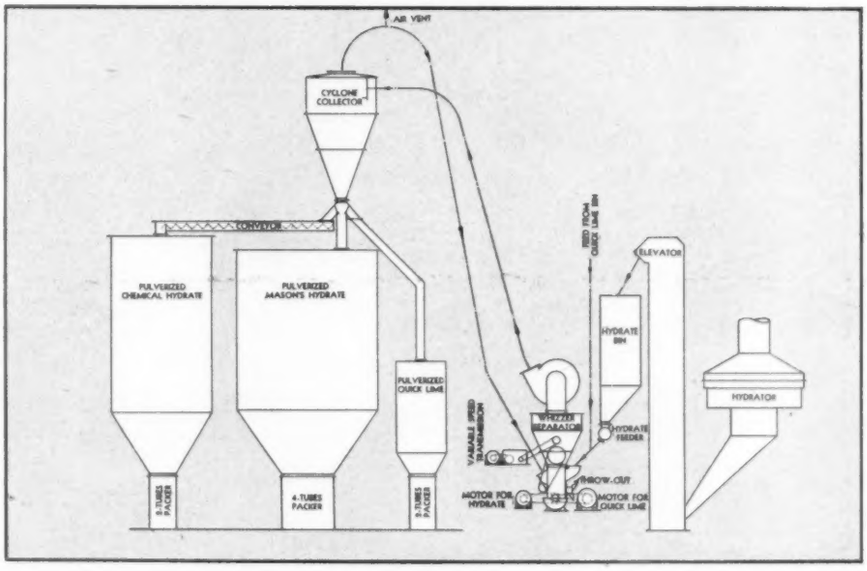
Nothing quite equals the famous Raymond Roller Mill for steady pulverizing operations, day and day out, amazing economy, negligible maintenance, lifelong service. Specially adapted for burnt lime, or for limestone . . . also operates as a Kiln Mill for drying and grinding limestone that contains considerable surface moisture.

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, Inc.

LIME MEN

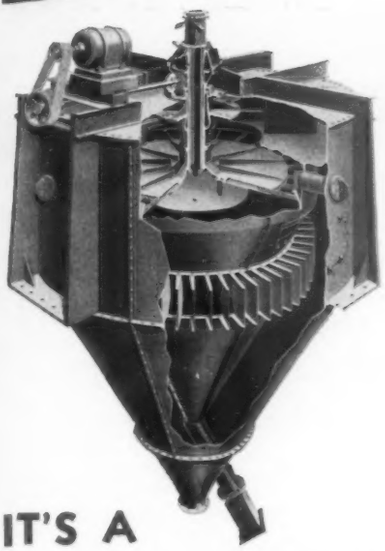
COMPARE YOUR METHODS of PRODUCTION with the RAYMOND SYSTEM of

ROTARY KILN FIRING
GRINDING BURNT LIME
SEPARATING HYDRATE



A DOUBLE DUTY UNIT

RAYMOND Automatic Pulverizer equipped with Whizzer Separator. Operates at one speed for producing burnt lime, discharging to first bin . . . runs at another speed for hydrated lime, delivering to second or third bin, according to grade . . . chemical hydrate or mason's lime. This system reduces production cost as much as 25% . . . write for details.



IT'S A WHIZZER

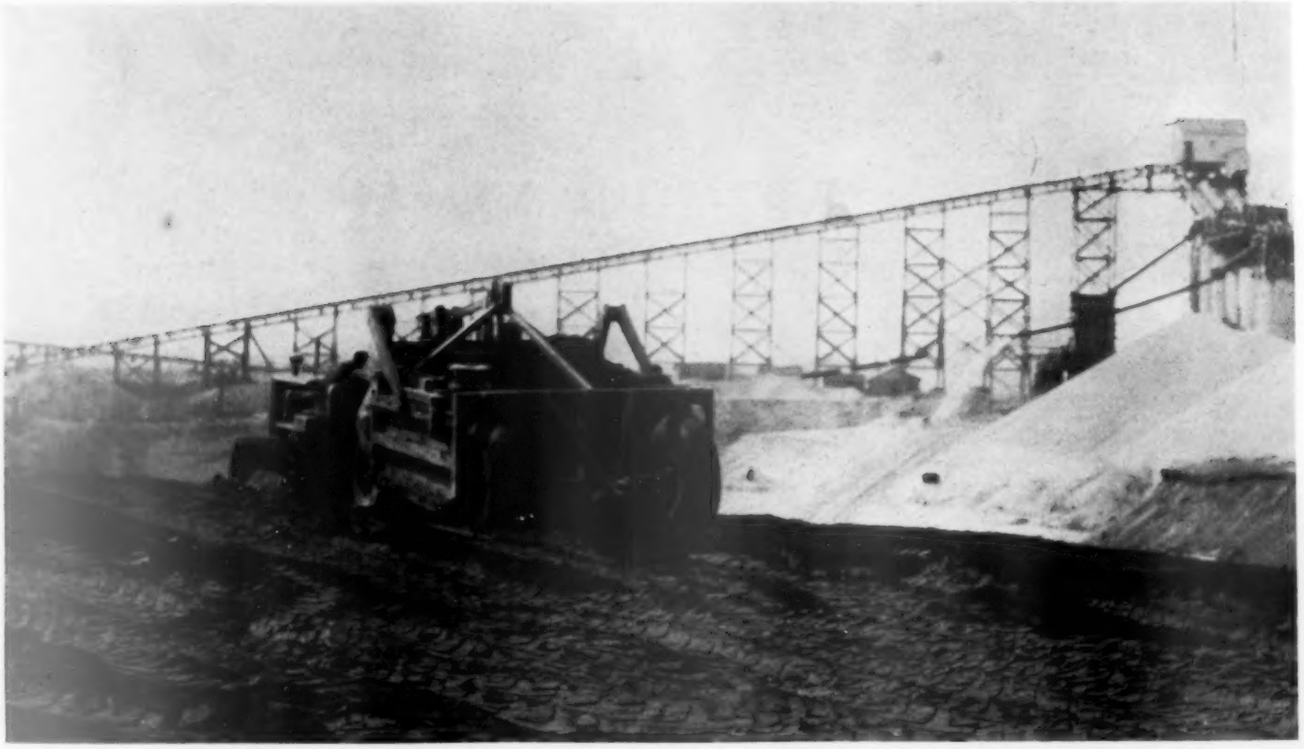
Latest model of Raymond Mechanical Air Separator for high efficiency classification of lime products. Takes lime feed direct from hydrator, separates out the available fines, and passes tailings to Automatic Pulverizer for recovering rest of good lime from lumps. New high quality, new low cost.

In a lime products plant, modernized with Raymond equipment, the operator reports excellent results in using the above described system of manufacture. When set for making hydrated lime at 80% to 99% passing 300-mesh, the mill delivers 4 to 5 tons per hour for coarse, and about 3 tons for fine stuff. When operated at high speed for producing burnt lime at 95% to 98% minus 200-mesh, the mill delivers 3½ to 4 tons per hour for the coarse and 2 to 2½ tons per hour for the fine.

1321 North Branch Street, CHICAGO

Sales Offices in Principal Cities.
In Canada: Combustion Engineering Corporation, Ltd., Montreal

LeTOURNEAU SCRAPER
quickly strips Pekin Pit



LeTourneau 12-Yard Carryall Scraper working for McGrath Sand and Gravel Company, Pekin, Illinois.

ACTUAL JOB DATA

Near Pekin, Illinois, McGrath Sand and Gravel Company recently put a LeTourneau 12-Yard Carryall, pulled by a "Caterpillar" RD8, to work stripping overburden on a 1300-foot round-trip haul. This outfit delivered an 8-cubic yard load each 4.83 minutes, moved approximately 100 cubic yards of material hourly. Thus, another aggregate plant cuts its stripping costs to a new low.

*The information contained in this advertisement was gathered and its accuracy is certified by our Promotional Engineering Department. You are invited to call on this Department for aid in estimating and planning how best to handle your material moving problems.

Ask your "Caterpillar" tractor dealer to show you how LeTourneau equipment can reduce both stripping and material handling costs for you.

R. G. LeTOURNEAU, INC., PEORIA, ILL., STOCKTON, CALIF.

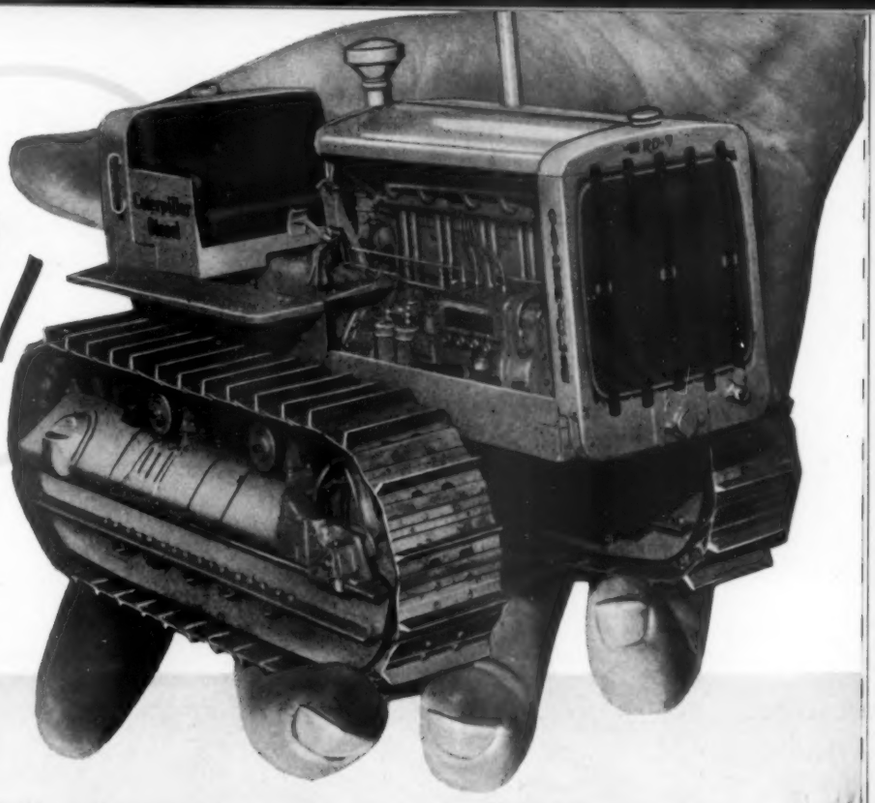
Cable Address: "Bobletorno"

Manufacturers of: ANGLEDOZERS*, BUGGIES*, BULLDOZERS, CARRYALL* SCRAPERS, CRANES, DRAG SCRAPERS, POWER CONTROL UNITS, ROOTERS*, TREEDOZERS.

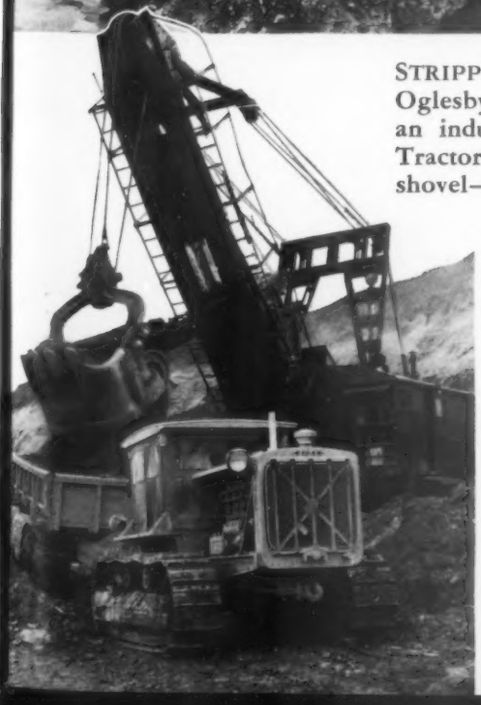
* Name Registered U. S. Patent Office.

LE TOURNEAU

TAKE IT...
TRY IT ON
Your job!



IT CUT STRIPPING COSTS FOR MARQUETTE CEMENT CO.



STRIPPING a 30-foot bed of overburden near Oglesby, Ill., the Marquette Cement Co. replaced an industrial railroad with "Caterpillar" Diesel Tractors hauling track-type wagons away from the shovel—and lowered stripping costs to a fraction of what they were formerly. Three RD8 Tractors haul 13-yard Athey two-way dump wagons from the 3½-yard shovel and move material in all kinds of weather. They work four 6-hour shifts, and have materially increased shovel output. These tractors haul directly to the fill—shortening the haul by eliminating the extra distance the railroad ran to avoid steep grades.

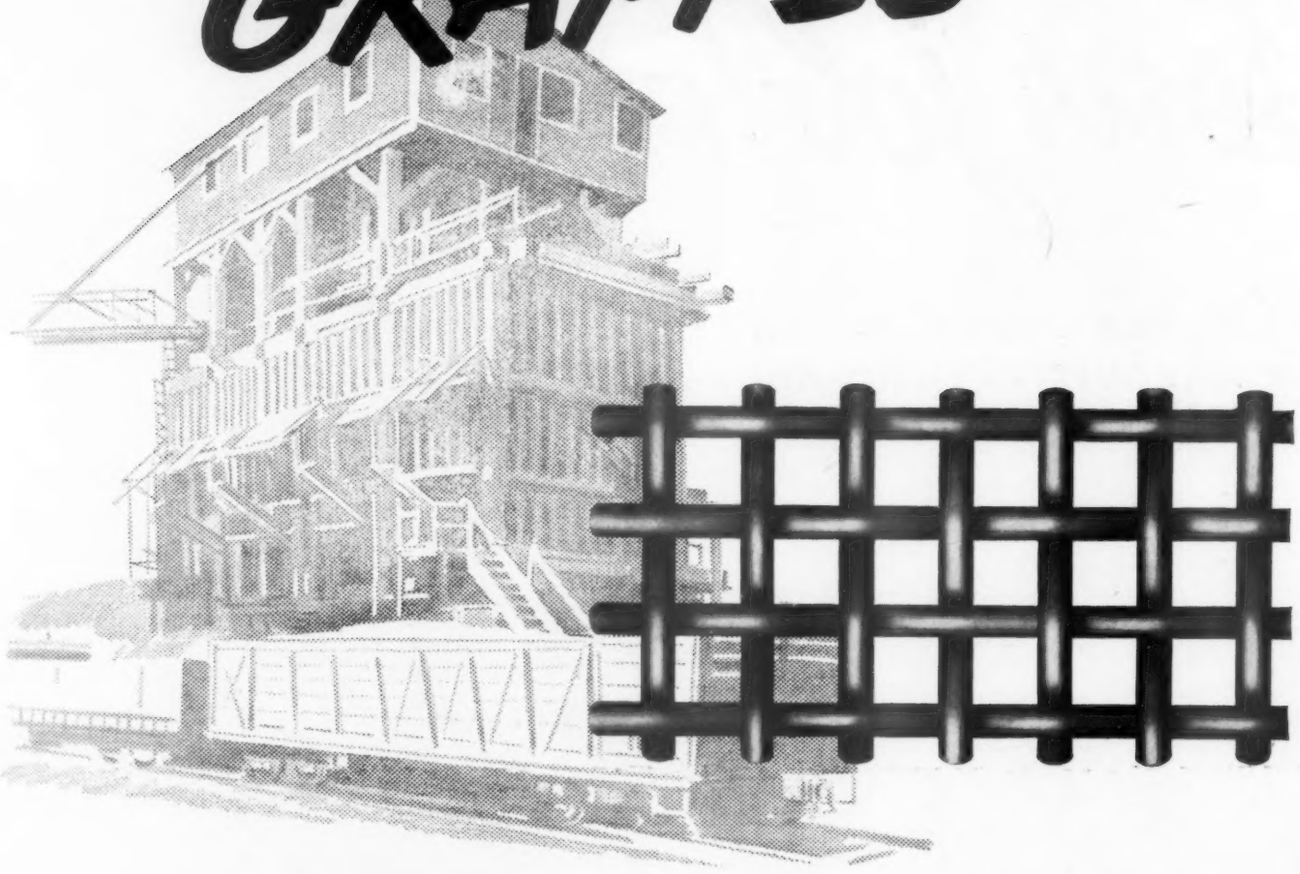
Your "Caterpillar" dealer can give you comparative cost records on several types of hauling equipment—each best under certain conditions. Tell him you want to be *shown* how "Caterpillar" Diesels can lower *your* costs and speed *your* work.

CATERPILLAR TRACTOR CO.
PEORIA, ILL.

REG. U.S. PAT. OFF.

WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES, TRACK-TYPE TRACTORS AND ROAD MACHINERY

BUILT TO GRAPPLE



...WITH TOUGH SERVICE!

ONLY wire that is built to "take it" stands a chance in the gruelling tussle of screening operations.

Making wire has been Roebling's business for over 90 years. This long experience enables us to build into a screen the qualities of strength and resistance to vibration so necessary for long and efficient screen life.

Why not let this knowledge of wire screen making help in the solution of your screening problems? Whether for sizing, cleaning or grading, Roebling Wire Screens are available in types and metals for all needs.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*

ROEBLING *Wire Screen*

TRADE JERSEY MARK

90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE

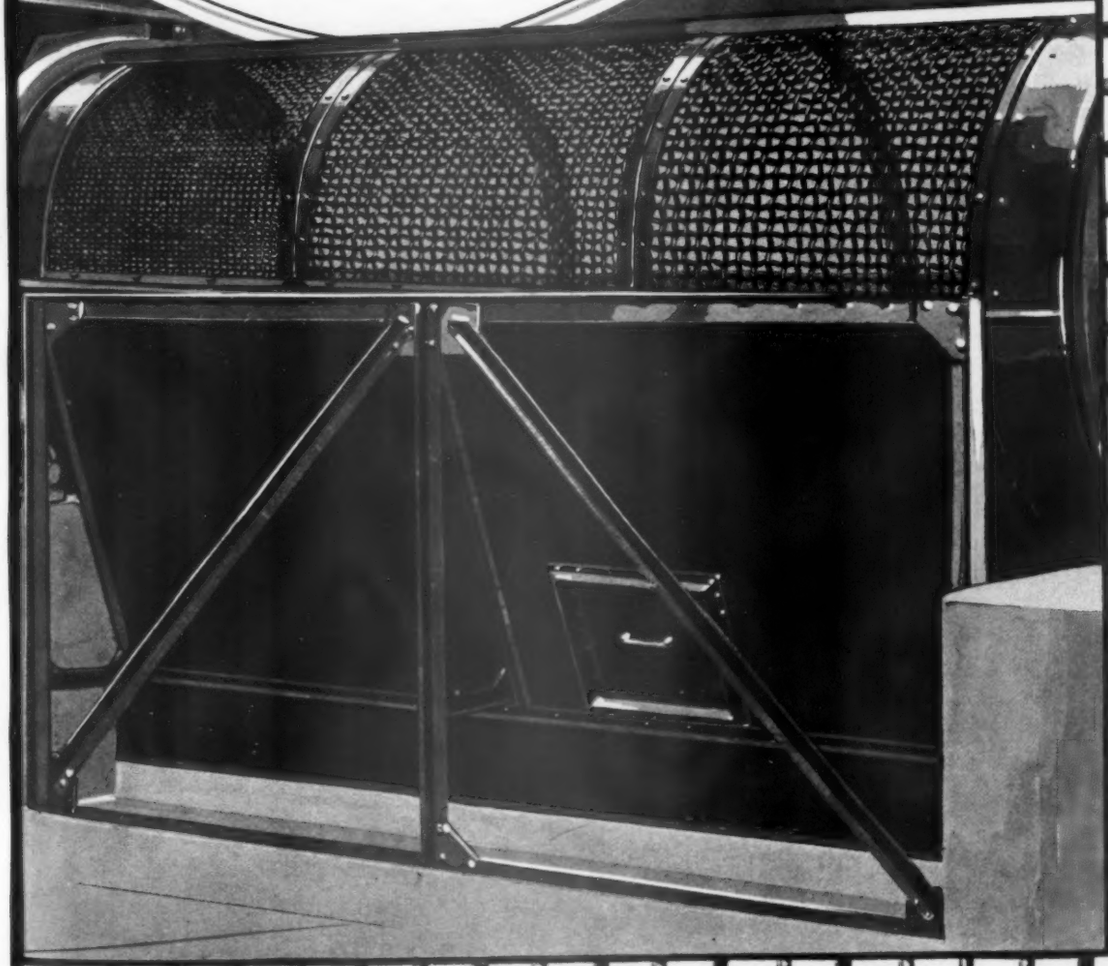
Woven Revolving Screen Jackets

have unobstructed open space enough to pass ALL undersizes.

Woven Screens have *More Holes per square foot* than other screening surfaces—20% to 40% more opportunities for passable sizes to escape from the crushing circuit.

In addition, because of scientific crimping, the rasping surface of the Woven Screen raises the load 50% higher on the rising cylinder wall; the resulting long cascade affords multiplied contact with the screen openings. The finer particles are segregated *toward the screening surfaces;* they reach the highest point before cascading, and cascade most slowly and in closest contact with the cylinder walls. The coarser particles are first to seek the trough of the cylinder, get first chance at the unobstructed openings, pass through instantly if of satisfactory size, or travel fastest with the pitch of the screen if too large to pass the openings.

"Getting Results with Ludlow-Saylor Screens" is a 200-page summary of America's latest achievements in screening practice and screen-control of process operations . . . A copy will be sent free upon request to any reader of Pit and Quarry



LUDLOW-SAYLOR WIRE CO.
610 S. Newstead Ave.
St. Louis, Mo.
Please send us Book No. 48-E
"Getting Results."

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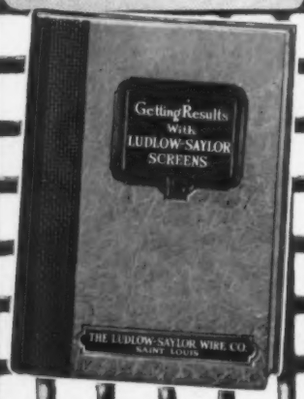

The LUDLOW-SAYLOR WIRE COMPANY ST. LOUIS
610 S. NEWSTEAD AVE.

LUDLOW-SAYLOR WIRE CO.
610 S. Newstead Ave.
St. Louis, Mo.
Please send us Book No. 48-E
"Getting Results."

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Wire Cloth of Phosphor Bronze, Brass, Copper, Monel, Aluminum

—any special metal, for any sort of service.

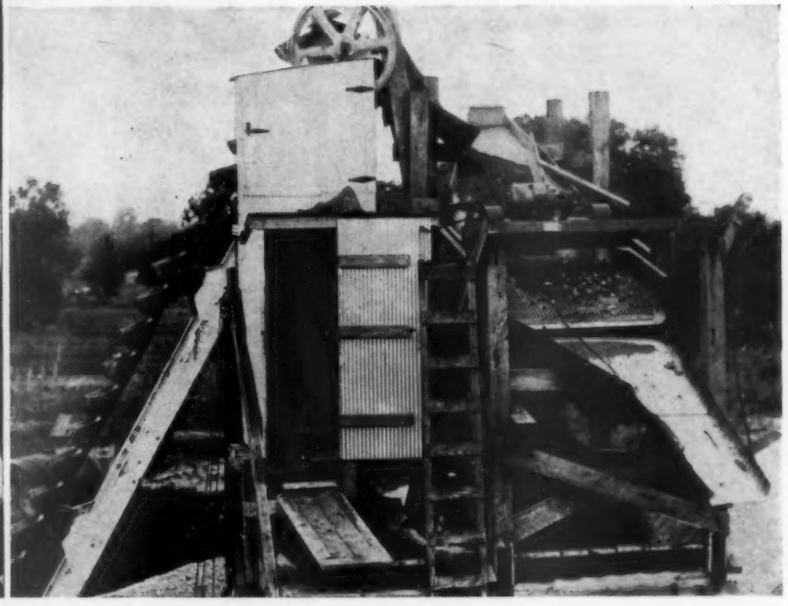
Tremendous Ludlow-Saylor stocks supply a thousand weights and weaves of Wire Cloth, in standard widths. Special requirements are quickly made to order.

To meet any chemical or physical condition—heat, pressure, corrosion, vibration—special Wire Cloths can be provided to get the maximum productivity from plant and equipment investments.

"Getting Results with Ludlow-Saylor Screens" is a 200-page summary of America's latest achievements in screening practice and screen-control of process operations . . . A copy will be sent free upon request to any reader of Pit and Quarry

LUDLOW-SAYLOR WIRE COMPANY ST. LOUIS
610 S. NEWSTEAD AVE.

SKF-EQUIPPED BUILT BY DEISTER MACHINE CO.



Free from trouble for 5 years, **SKF** *Bearings*

PASS A SCREEN TEST

Deister knows that SKF Spherical Roller Bearings are gluttons for punishment by the way they work on this Type 246 Double Deck 4' x 6' Plat-O Vibrating Screen.

Day after day SKF Bearings helped this screen size up to 110 tons of material per hour at a vibrating speed of 1470 R.P.M. And at the end of five years of hard service, Deister writes, "There has not been a single bearing failure in a Plat-O Screen, or even a replacement due to ordinary wear." You will find this kind of performance duplicated in many machines, for SKF Bearings are accustomed to stand up where ordinary bearings fall down.

3849

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

MORE THAN
1200
TYPES AND SIZES
Industry comes to SKF for unbiased bearing counsel because SKF makes practically all types of anti-friction bearings.

SKF

BALL AND ROLLER BEARINGS

Model 99 Hug Quarry Special. Designed for heavy duty quarry service; with 10-yard Hug Quarry Body—36,000 lbs. pay load capacity.

HEAVY DUTY HAULING DEMANDS REAL HEAVY DUTY EQUIPMENT

Contractors, quarry operators, dirt movers, in fact the entire field of heavy dump truck movers, recognize the superior features of Hug transportation equipment, because Hug offers a *real heavy duty transportation unit.*

Hugs are built throughout with extra heavy duty truck units, including massive arc welded I-beam frames, powerful heavy duty truck engines, rugged axles, transmissions, and springs. All the way through, Hugs are completely designed to operate profitably on the toughest jobs.

Hug Roadbuilder chassis and dump bodies are engineered and built as a completely balanced, integral unit. This heavy duty construction, balanced load distribution, short wheel base and turning radius together with Hug special features of design puts Hug in a heavy duty hauling class by itself.

Bring your transportation problems to Hug, for whatever your requirements there is a Hug unit that will lick them *profitably.* Let Hug engineers show you *why* the superior transportation features of Hug Roadbuilders will greatly reduce your hauling costs.

THE HUG COMPANY
501 Cypress Street Highland, Ill.

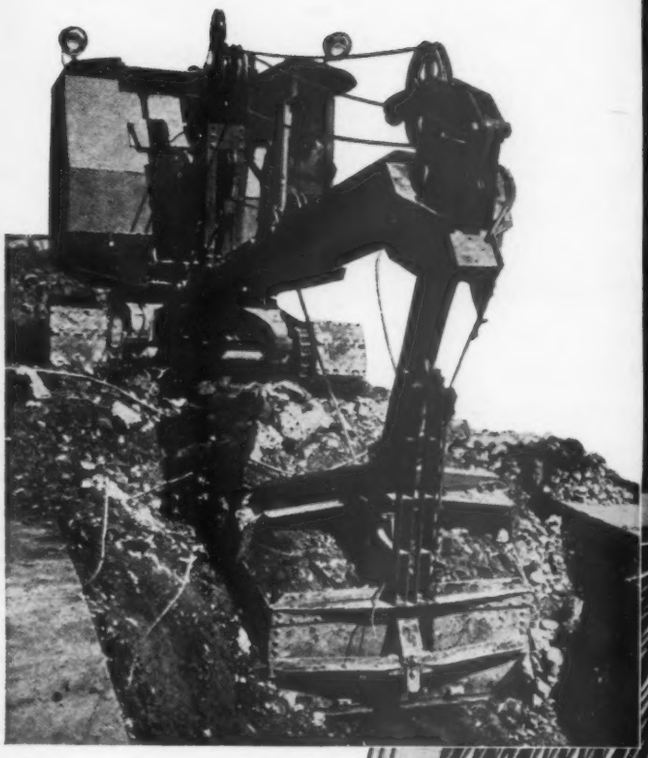
Model 87Q Hug Roadbuilder. Equipped with 6-yard Hug Scoop End Body and high dumping angle hoist, especially engineered for dirt and rock hauling.

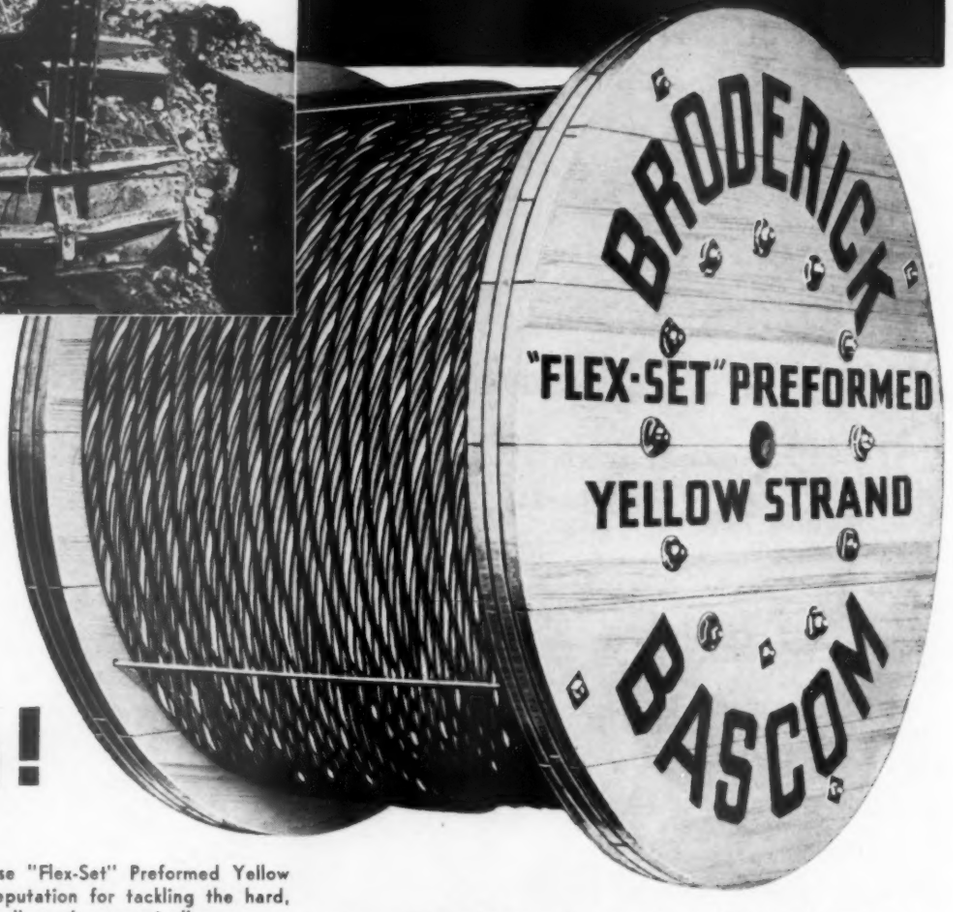
Model 87Q Hug Roadbuilder. With 6-yard Easton Phoenix Side Dumping Quarry Body. Designed particularly for quarry service.

Model 97L Hug Roadbuilder. Equipped with 8-yard Hug Rock Body and down folding tail gate — for dirt and quarry operations.

BUILT TO MEET A CONDITION

"Flex-Set" Preformed YELLOW STRAND





It's Tough!

Yes, tough is the word—because "Flex-Set" Preformed Yellow Strand has a well established reputation for tackling the hard, grilling jobs, and doing them well—and economically.

The same specially drawn wire is used that put Yellow Strand wire rope at the very top years ago. It still must pass searching tests in the B & B laboratory. But now the wires are pre-shaped to the helical form they occupy permanently in the finished rope.

And what is the result? *Longer life* — because the rope is practically pre-broken in, rotation on shafts and drums is greatly reduced, and there is remarkable resistance to kinking and fatigue.

Where the job is tough—on power shovels, dragline machines, derricks, excavators—let a tough rope do the work. That's "Flex-Set" Preformed Yellow Strand.

Broderick & Bascom Rope Co., St. Louis

Factories: St. Louis, Seattle, Peoria.

Branches: New York, Chicago, Seattle, Portland, Houston.

U-15R3

BUCYRUS-MONIGHAN

NEVER an idle moment!

Observe the Walker at a gravel pit. First, you'll see it stripping or digging gravel. Then, you'll find it loading the gravel onto cars or conveyors. This great adaptability makes it the busiest piece of equipment at the pit.

Because of its remarkable traction, the Walker can instantly step away from a cave-in or slide; can operate on ground that would hopelessly "stymie" other types of machines. Manufactured by Bucyrus-Monighan Co., Chicago, Illinois.

The Walker is always busy. It can strip or load from the top of the bank.

BUCYRUS MONIGHAN

Sold by BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WISCONSIN, U.S.A.

REPUBLIC
CONVEYOR BELTS
can Take Abuse!

BUILT with tough, abrasion-resisting rubber covers, Republic Belts stand up under continuous heavy loads of sharp rock, ore and coal. Their strong, resilient, fabric bodies absorb the shocks of sudden starting under load and the impact of falling materials. Install them where the service is most severe.

Conveyor and Elevator Belts must be designed to fit the job. Hot, fine materials need a belt with extra thick cover of special rubber to prevent the fabric from being burned. Rock handling belts require a rubber that withstands cutting, gouging and abrasion. Republic Engineers have the knowledge and experience to build belts that give best performance under any particular condition. Call them in for expert advice on your needs.

The REPUBLIC RUBBER *Company*

YOUNGSTOWN • OHIO

Manufacturers of HOSE
BELTING • PACKING
MOLDED PRODUCTS

ORDER REPUBLIC RUBBER PRODUCTS FROM YOUR DISTRIBUTOR

Get this:

WILLIAMSPORT

PURPLE STRAND "Form-Set" is MADE to be TOUGH!

SOME JOBS should be tackled with *nothing less* than preformed rope, and your job may be one of the toughest.

If so, you'll need all the strength and stamina, the uniform wear and handling ease that our preforming process puts into wire rope.

For peak performance, proved on the job — use Purple Strand "Form-Set."

WILLIAMSPORT WIRE ROPE CO.

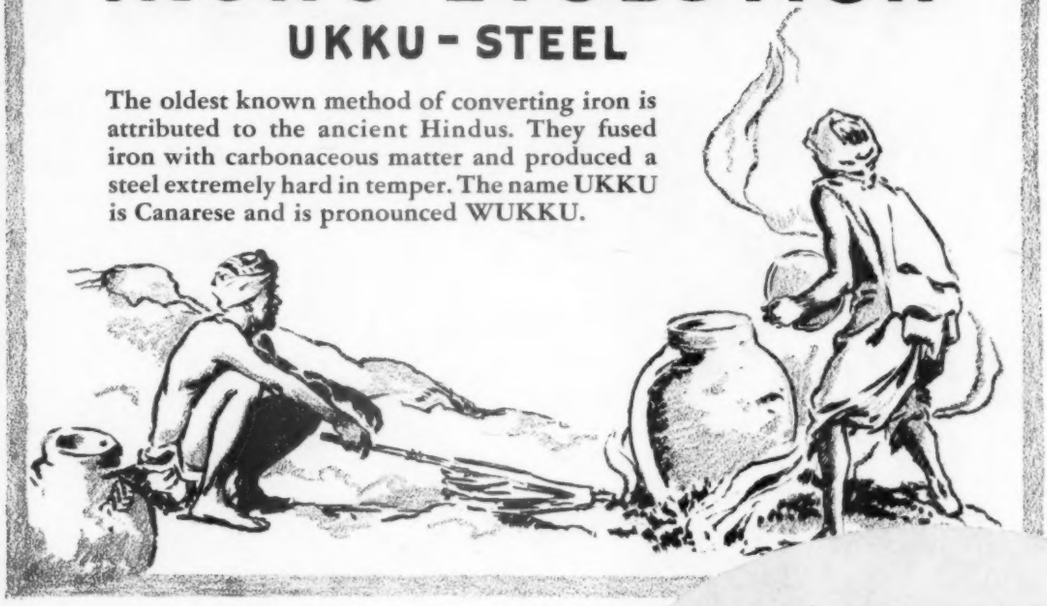
Williamsport, Pa. 122 So. Michigan Ave., Chicago, Ill.

Other Offices in All Principal Cities

IRON'S EVOLUTION

UKKU - STEEL

The oldest known method of converting iron is attributed to the ancient Hindus. They fused iron with carbonaceous matter and produced a steel extremely hard in temper. The name UKKU is Canarese and is pronounced WUKKU.



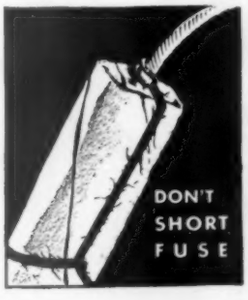
AND TODAY.. *The* WITHERBEE SHERMAN CORP.

Produces a Rich Iron Ore . . .

—In great demand by modern industry and used in the making of many fine alloy steels. The underground workings of the Witherbee Sherman Corporation are located in northern New York State. For years they have yielded an extremely valuable iron ore known as Magnetite —an extremely hard ore, lying in rich veins entirely surrounded by rock. Naturally, this hard ore increases drilling and blasting problems — requires extreme efficiency throughout production cycles—close attention to details.

Ensign-Bickford Safety Fuse is used. It is a detail that can be depended upon to cooperate perfectly. A century of unrelenting care—a policy of never-ending research—contribute to its perfection.

Ensign-Bickford Safety Fuse offers the assurance of dependable blasting. It is always available in a number of standardized brands, each designed for a particular set of conditions . . . Write for a free copy of the Safety Fuse Book.



ENSIGN-BICKFORD SAFETY FUSE

THE ENSIGN-BICKFORD CO. SIMSBURY, CONNECTICUT

SF64

UTAH

Positive Electro-Magnetic Heavy Duty Feeder

• Controlled

New electrically operated feeders provide positive control of the rate of feed at all times. The amplitude of vibration is readily changed over a wide range ... by simple manual adjustment of a hand wheel. Utah feeders handle both large material and fine. Dual magnets give positive action in both directions.

• Utah positive action electro-magnetic screens and conveyors are other new Allis-Chalmers products employing this principle of operation.

EQUIPMENT ENGINEERS TO INDUSTRY

ALLIS • CHALMERS

MILWAUKEE WISCONSIN

For further information on Utah Vibrating Feeders, Ask for Bulletin 1833.

767

HUSKY FRONT ENDS for Tough Digging

CUBIC 3/8 YARD

CU. 3/4 YD.

CUBIC 1/2 YARD

5/8 CU. YD.

HERE IS THE BUSINESS END OF A NORTHWEST MODEL 15 - 3/8 YD. SHOVEL

Ruggedness IS WRITTEN ALL OVER IT

The boom—welded and designed to overcome digging conditions far harder than the ordinary small shovel can meet. (Remember no *Northwest* welded boom has ever failed).

The stick is welded—and the full 3/8 yd. struck measure dipper has a manganese front.

Behind this is the Northwest Independent Crowd—the crowd that utilizes power other shovels waste! This design is characteristic of all Northwests. They have the toughest front ends on any shovel, size for size. Altogether they are the finest pieces of equipment of their type and capacity on the market today—and we can prove it!

NORTHWEST ENGINEERING COMPANY
1822 Steger Building 28 East Jackson Boulevard
Chicago, Illinois

GASOLINE • ELECTRIC • DIESEL • OIL

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

NORTHWEST

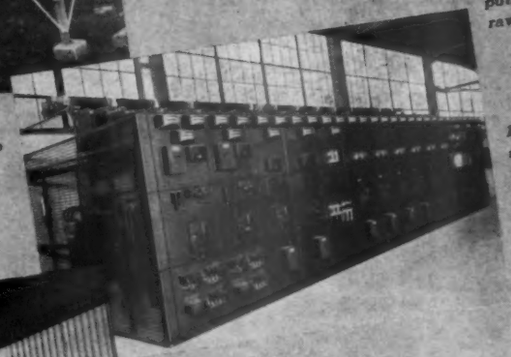
SHOVEL • CRANE • DRAGLINE • TRUCK SHOVEL • TRUCK CRANE

LOW MAINTENANCE WITH G-E EQUIPMENT

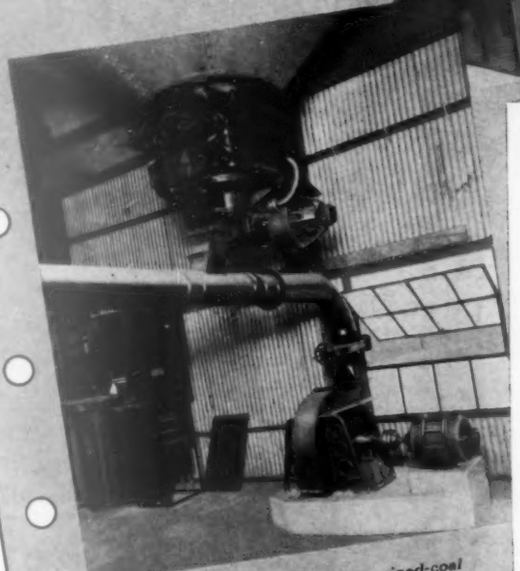
Reports Volunteer Portland Cement Company

G-E transformers in outdoor substation. In ten years they have given "no trouble whatsoever"

Induction motors driving pumps in basement between raw and finish grinding mills



14-panel switchboard in millroom, power distribution center for entire plant



Type CD d-c motor driving pulverized-coal feed and induction motor driving fan

Notes on trip through plant

HERE is part of a letter from Mr. Charles F. Lewis, Manager, Volunteer Portland Cement Company, concerning the performance of G-E equipment in the plant near Knoxville, Tenn., where for ten years high-grade cement has been produced by the most modern, efficient methods.

"In reviewing our experience with this equipment through this period we find it has been very satisfactory, both for its performance and in your active interest in its performance. We have had no trouble whatever with our transformers; we have had to do nothing to the switchboard beyond occasionally dressing the main contacts of the oil switches and recalibrating instruments. Motor bearing trouble has been very light, and we have put new windings in only 4 motors.* One of these motors we have rewound 2 or 3 times, but it has been running with overloads up to 80 or 100 per cent from the start."

Throughout the rock-products industry, G-E equipment is noted for its low maintenance. Call the nearest G-E representative for further information. General Electric, Schenectady, N. Y.

**There are about one hundred G-E motors in this plant.*

011-170

GENERAL ELECTRIC

Roebling...

The pacemaker in wire rope development

THE most exacting basis for judging wire rope performance is AVERAGE SERVICE.

This is the basis advocated by Roebling, in which rope cost per ton of material handled, or per other unit of service measurement, is based not on the service of a single rope but on the *average* service of several ropes.

John A. Roebling's Sons Co.,
Trenton New Jersey

THE ROCKWELL TEST, *made regularly in our laboratory, checks gradation of hardness of USS Lorain Grinding Balls to assure uniform grinding and long service.*

MEASURED TOUGHNESS

PRODUCTION of USS Lorain Grinding Balls is definitely controlled right through to the finished product. These balls are forged from Carnegie-Illinois *controlled steel* which has been rolled to pre-determined specifications. They are forged by experienced workmen . . . with modern equipment.

Precision in heat-treating processes is carefully guarded to produce grinding balls that are hard enough to withstand abrasion over a long period of time and yet resilient enough to prevent splintering. Long life and maximum grinding effectiveness are assured by constant checking during production and by routine laboratory tests on samples of each production. This is your guarantee that USS Lorain Grinding Balls are made *right* . . . suited to the tough wear of your grinding processes.

Specify USS Lorain Grinding Balls. They are available in the following sizes: ½", ⅝", ¾", ⅞", 1", 1¼", 1½", 2", 2½", 3", 3½", 4", 4½", and 5".

• OTHER LORAIN PRODUCTS

Mill Liners and Screens of High Carbon Rolled Plate, Manganese, Chrome Nickel, Chrome Nickel Molybdenum, and plain Carbon Steel or Hard Iron; Hammers for Swing Hammer Mills, Industrial Cars, and Trackwork.

U·S·S LORAIN GRINDING BALLS

CARNEGIE-ILLINOIS STEEL CORPORATION

Lorain Division — *Johnstown, Pa.*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Buy from the complete line – demand Universals!

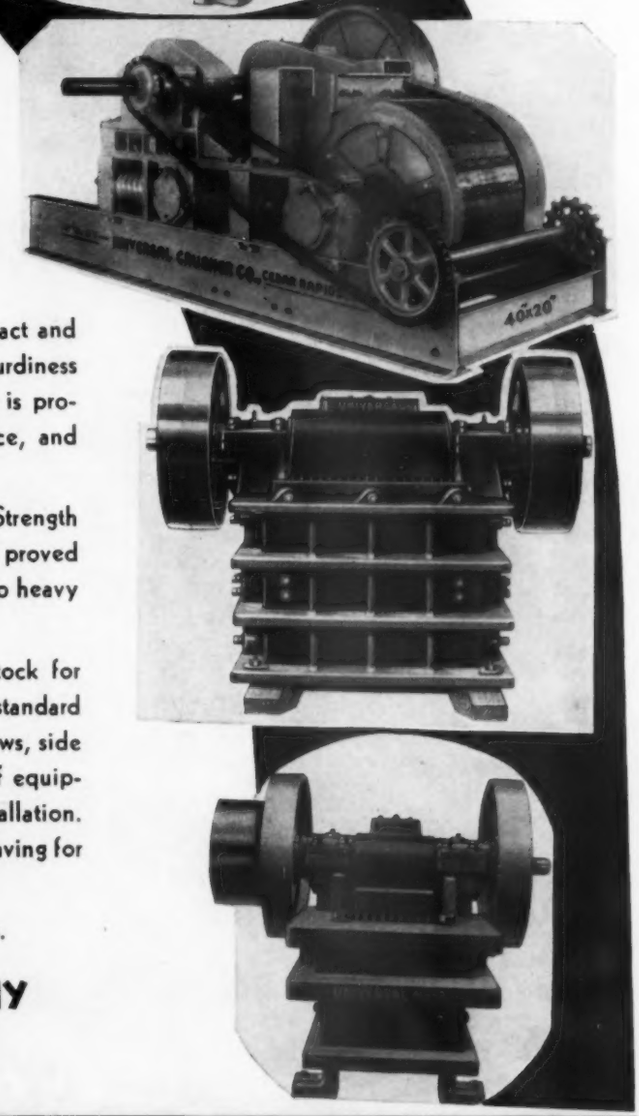
No matter what your crusher needs may be: jaw crushers; roll crushers; primary or secondary crushers; stationary or portable crushers; single units; complete plants—no line is as complete, as fully developed, or as proved by long service as Universal's. A type of unit for every job—a size of unit for every production demand.

Universal designs are modern—roller bearings—the use of impact and abrasion resistant manganese steel on wearing parts—oversize sturdiness—accessibility—quick and easy renewal of parts—everything is provided for simple installation, fast operation, long time service, and lowest cost per ton handled!

Universal construction is rugged. Dependability is inbuilt. Strength and long life are guaranteed. Each Universal unit is tested and proved—each design the result of intelligent field study interpreted into heavy duty, long life equipment.

Many crushers in the broad Universal Line are carried in stock for immediate shipment—others can be rapidly assembled from standard parts on hand—Universal delivery is prompt! Wearing parts, jaws, side plates, roll shells, etc., are stocked for every size and type of equipment we make; each is jig finished to facilitate quick, easy installation. Genuine Universal parts are a guarantee of time and money-saving for Universal users.

Ask your Universal distributor or send for details and catalogs.



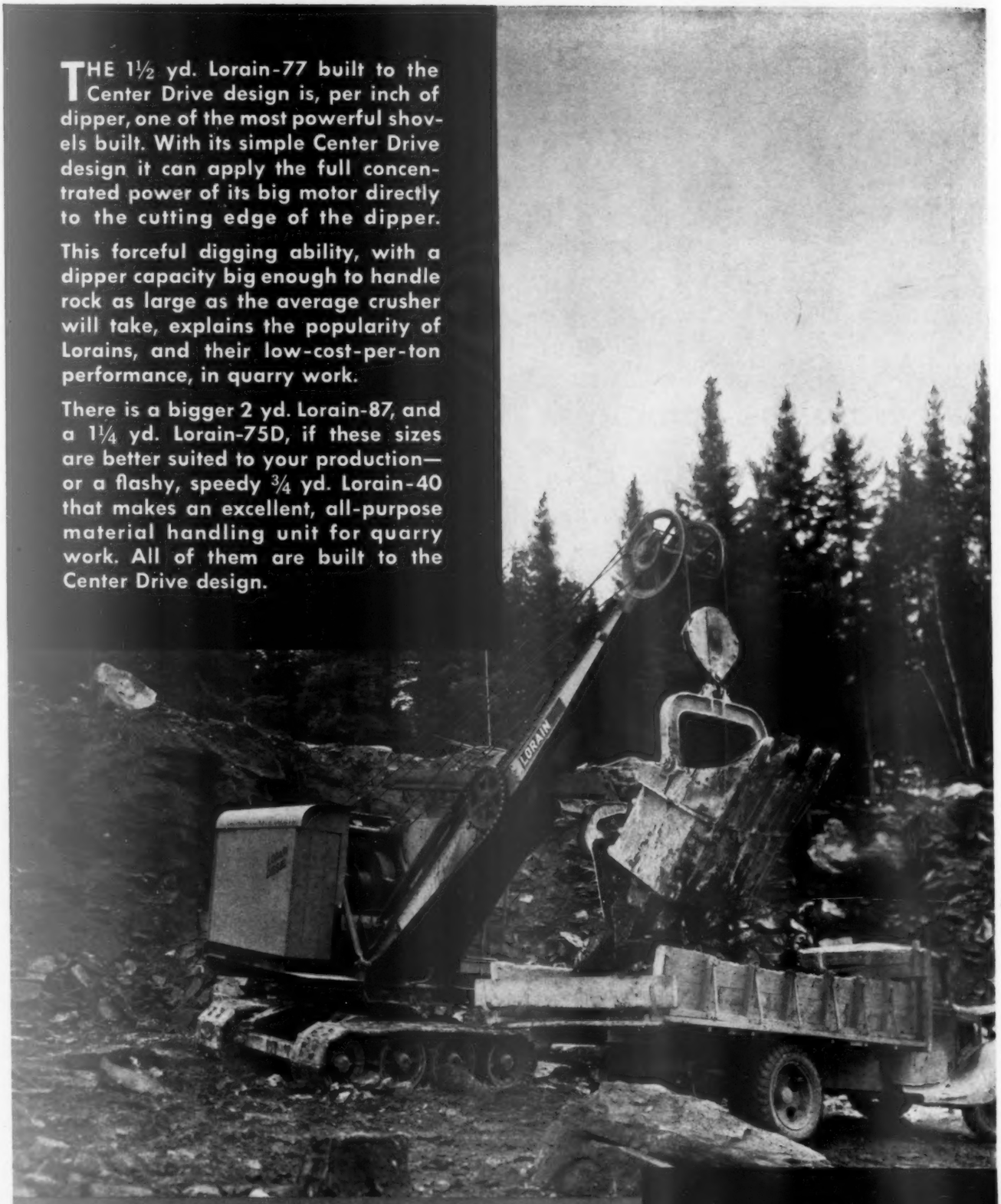
UNIVERSAL CRUSHER COMPANY
619 C Avenue, West
Cedar Rapids, Iowa

UNIVERSAL

THE 1½ yd. Lorain-77 built to the Center Drive design is, per inch of dipper, one of the most powerful shovels built. With its simple Center Drive design it can apply the full concentrated power of its big motor directly to the cutting edge of the dipper.

This forceful digging ability, with a dipper capacity big enough to handle rock as large as the average crusher will take, explains the popularity of Lorains, and their low-cost-per-ton performance, in quarry work.

There is a bigger 2 yd. Lorain-87, and a 1¼ yd. Lorain-75D, if these sizes are better suited to your production—or a flashy, speedy ¾ yd. Lorain-40 that makes an excellent, all-purpose material handling unit for quarry work. All of them are built to the Center Drive design.



THEW CENTER DRIVE

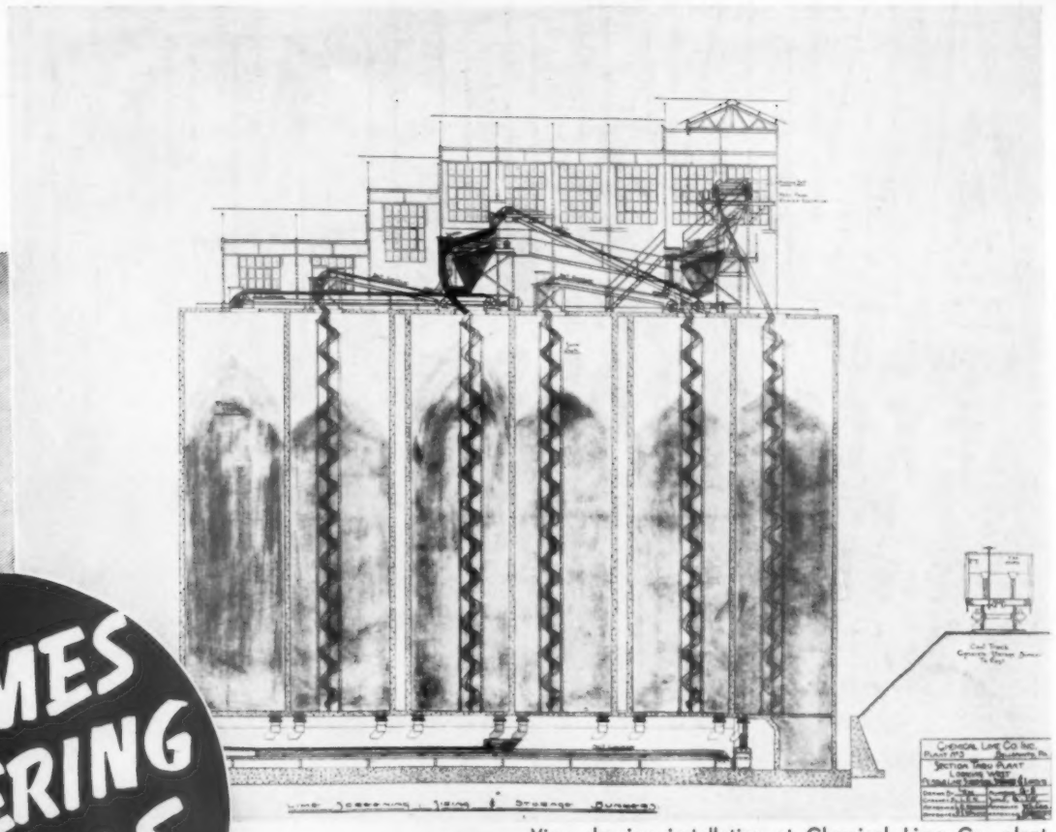
LORAINS

MOVE MORE MATERIAL, FASTER AT LOWER COST

CU. 3/8 to 2 YD.

THE
THEW SHOVEL COMPANY
LORAIN, OHIO

SHOVELS • CRANES • DRAGLINES
BACKDIGGERS • LOCOMOTIVE CRANES
DIESEL • GASOLINE • ELECTRIC



View showing installation at Chemical Lime Co. plant, Bellefonte, Pennsylvania.

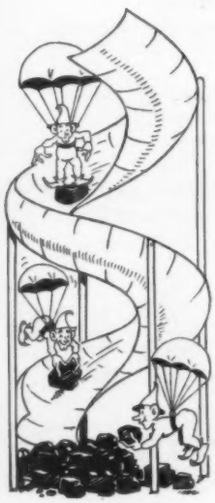
HOLMES LOWERING SPIRALS HAVE 3 BIG ADVANTAGES

Holmes Lowering Spirals prevent degradation and breakage of lime when filling deep storage bins. A smooth unbroken path is provided for the lime from conveyor discharge top to the bin bottom. The discharge of the material off the Spiral is toward the center, thus allowing a gentle rolling, complete filling of the bin.

With Holmes Lowering Spirals there are no voids in the material to reduce the storage space. The easy descent of the material treats the storage bin kindly and reduces wear and tear on the bottoms and sides.

Best of all, the Spiral costs nothing to operate—gravity is the motive power.

Holmes Spirals are built of formed steel plate sections, in seven sizes. They can be shipped in quarter sections to facilitate field assembly.



Write for Bulletin No. 63 which gives complete details regarding these efficient and economical Spirals.

ROBT. HOLMES & BROS., INC.

DANVILLE ILLINOIS

ANNOUNCING

TWO OF THE FASTEST EXCAVATORS in the Industry

P&H MODEL 855 2-YD.

P&H MODEL 955 2½-YD.

P&H Pacemakers—FASTER ON THE JOB

New Heavy-Duty Machines with Faster Digging Cycles

Here, modern engineering is carried further than ever before in an excavator. The new 855 and 955 combine the lightness and strength of new alloy steels with a more scientific distribution of weight to reduce unnecessary dead weight and step-up operating speeds.

1. LIGHTER—STRONGER—with all-welded construction of new high-tensile steels; makes possible faster operating speeds.
2. LARGER CLUTCHES, BRAKES, AND DRUMS, for heavy-duty work, to withstand the abuse of continuous high-speed operation.
3. HELICAL-CUT GEARS THROUGHOUT, for smooth, quiet power transmission. All high-speed shafts are carried on antifriction bearings.
4. LIVE BOOM, adjusts quickly to any digging angle; eliminates waste time in raising and lowering the boom.
5. DIESEL POWER, for heavier lugging ability; freedom from motor stalling, lower operating costs.
6. CONVERTIBLE, for dragline service or as clamshell crane.

Get the whole story on faster production at lower costs with these new excavators. For bulletins write Harnischfeger Corp.

4451 West National Avenue Milwaukee, Wisconsin

SEE THE P&H AGENT OR BRANCH OFFICE IN YOUR TERRITORY.

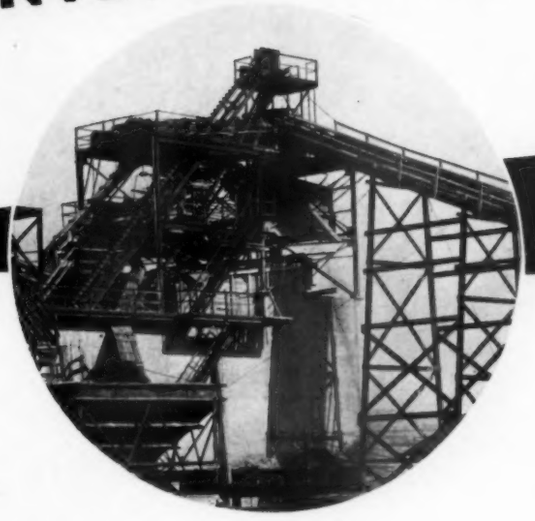
HARNISCHFEGER

CORPORATION

EXCAVATORS • ELECTRIC CRANES — QUALITY P&H SERVICE — HOISTS • MOTORS • ARC WELDERS

Another Plant . . .
EQUIPPED 100% WITH CINCINNATI CONVEYOR BELTS

● Name on request



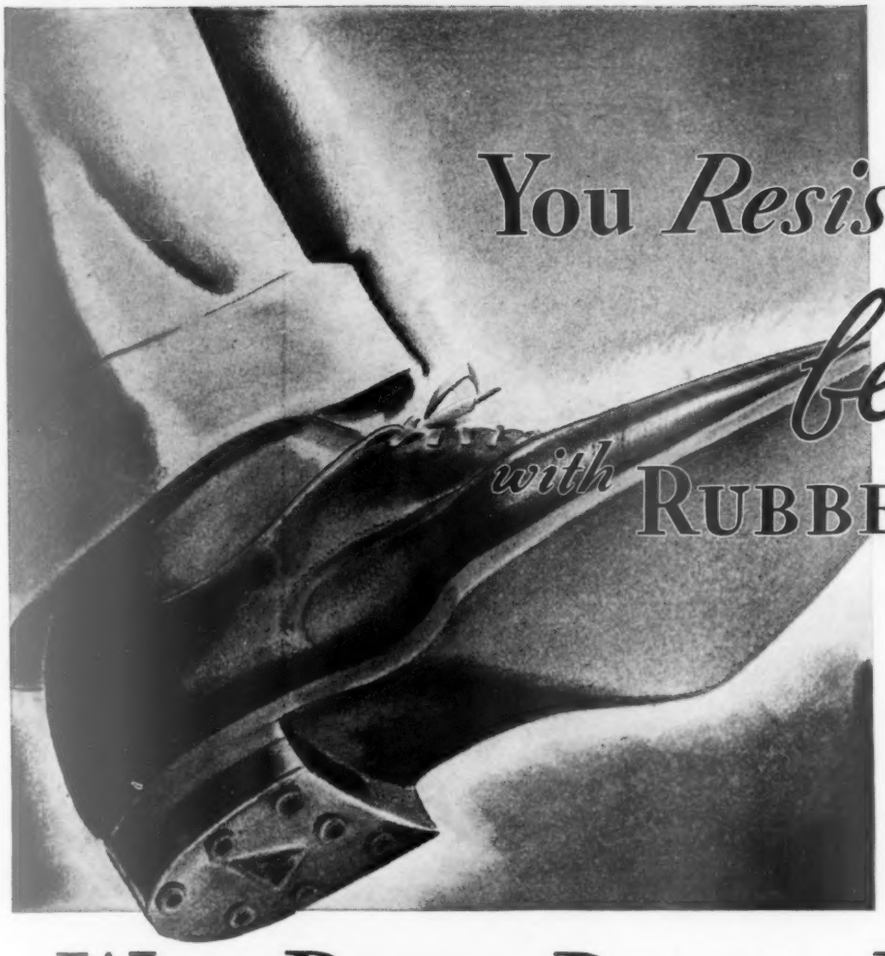
Another plant 100% "Cincinnati". Elevator belts and conveyor belts . . . from the very beginning of the system to the end are Cincinnati belts. Behind this set-up is a story of service, tonnage, and satisfaction that brought this complete change of belt equipment about. This gravel company started using Cincinnati belts back in 1925. A 440-foot, 24-inch, 6-ply belt turned the trick . . . showed this company what tonnage carrying power Cincinnati belts have. From then on all replacements were made with Cincinnati belts.

Cincinnati conveyor belts have shown by tonnage conveyed . . . by performance records from users . . . by the increased number going into service . . . by plants that are going "Cincinnati" 100% . . . that they are the belts for today's replacements.

THE CINCINNATI RUBBER MANUFACTURING CO.
CINCINNATI, OHIO

New York Atlanta Detroit Pittsburgh Boston Philadelphia Chicago Buffalo

CINCINNATI
CONVEYOR BELTS



You *Resist Fatigue better* with RUBBER HEELS..

..Wire Rope *Resists Fatigue longer when* PREFORMED

● Rubber heels very effectively reduce the strain and internal muscular stress of walking. They help you resist fatigue.

The preforming process very effectively reduces the internal torsional stress from within the wires and strands of wire rope. This reduction of stress and strain helps preformed wire rope resist fatigue—and therefore it lasts longer.

But not only does preforming tend to eliminate internal torsional stress, but it makes a rope that is flexible and limber, easy to handle, and one that resists kinking. Preformed rope requires no seizing when cut. It splices easily, runs true and spools perfectly. For many jobs preformed rope will give you much greater dollar value. Ask us to send you a sample of preformed rope. It will come to you without obligation or salesman's "follow-up."

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2. The end of the steel does not bottom in the bit and therefore is not subject to impact. Thus *it does not upset or mushroom and make removability difficult.*

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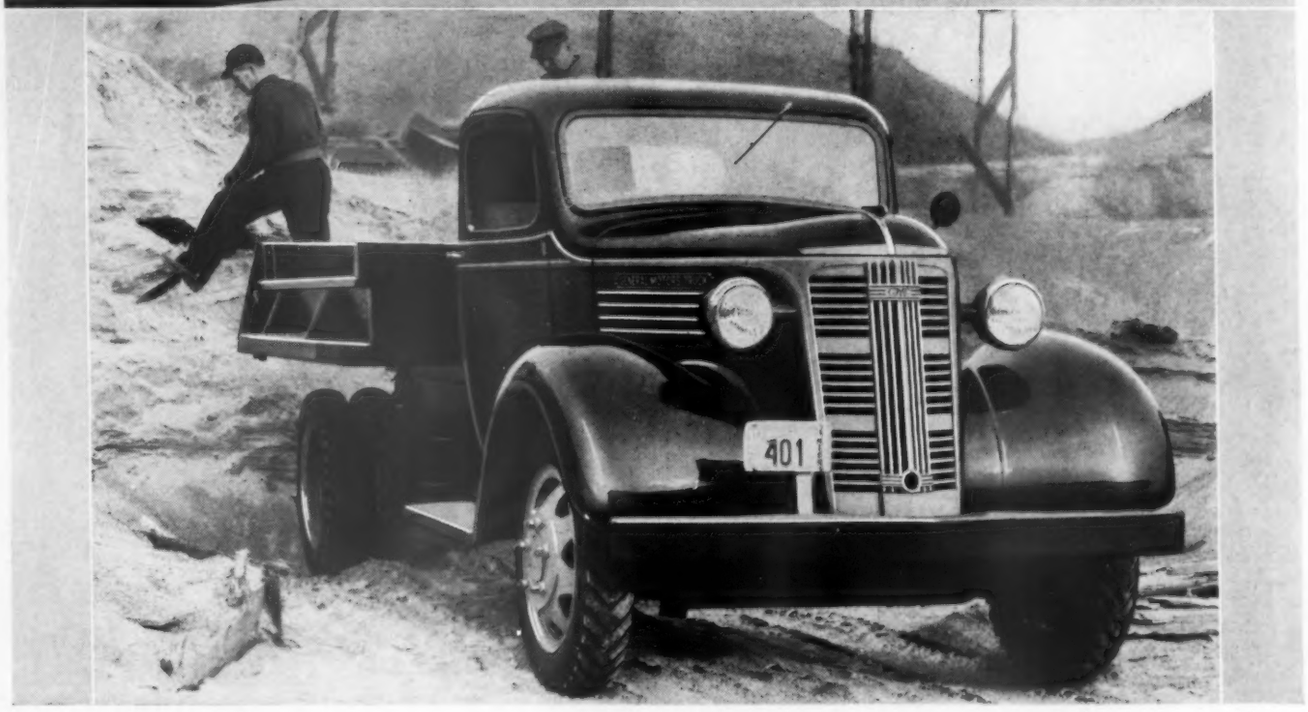

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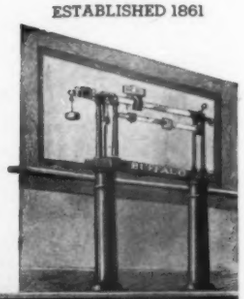

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Cutway view of latest type Buffalo Scale showing exclusive Single Link construction, structural Bridge design and minimum excavation and foundation required.

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PIT AND QUARRY

Vol. 29 MAY, 1937 No. 11

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H. W. BAUMGARTNER
President

STANLEY A. PHILLIPS
Vice-President and Directing Editor

Field Editor:
W. E. TRAUFFER

Assistant Editor:
HARRY F. UTLEY

Circulation Manager:
W. T. KLUSSMAN

•

Advertising Manager:
JAMES E. MONTGOMERY
Telephone HARrison 9357
Chicago, Ill.

Eastern Advertising Manager:
W. A. BUSCHMAN
Room 420, 122 East 42nd St.
Telephone CALedonia 5-4438
New York, N. Y.

Central Advertising Manager:
W. H. SANDERSON
Auditorium Bldg.
Telephone CHerry 6339
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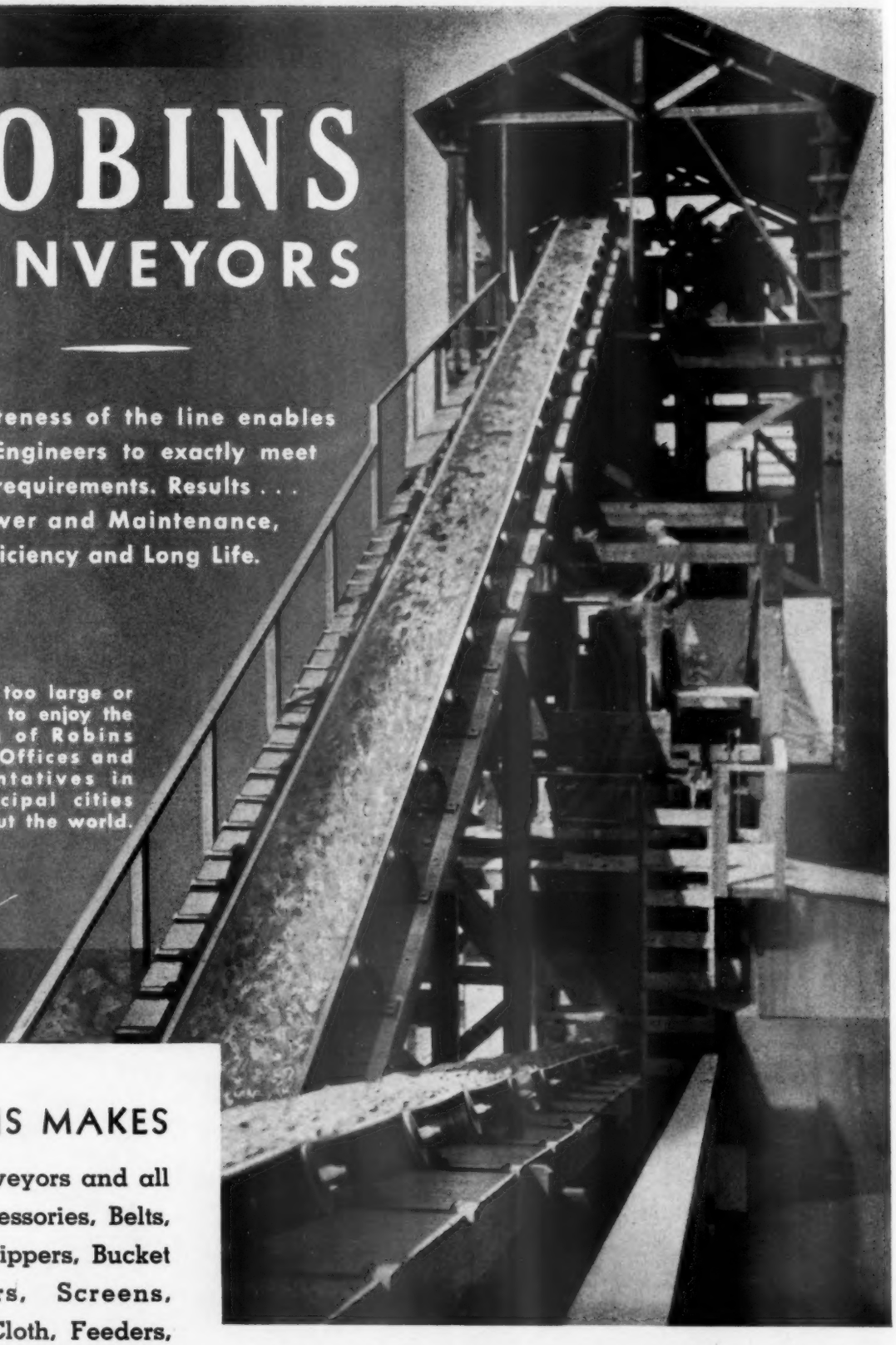

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Cement Industry Loses One of Its Pioneers

GEORGE E. NICHOLSON PASSES ON

George E. Nicholson, 76, pioneer in the cement industry and president of the Georgia Cement & Products Co., of Atlanta, Ga., and of the National Cement Co., Birmingham, Ala., died April 9 in an Atlanta hospital.

He had been in ill health for a number of years, but was active until last fall.

He was a native of New York, of English parentage, and spent most of his boyhood and early life in the middle west. He organized companies and built cement plants in Kansas City, Des Moines and Richard City, Tenn. In 1920 he bought a cement plant at Ragland, Ala.

He was formerly president of the Kansas City Gas Co., and well known in Kansas City, Mo., where he spent many years.

Mr. Nicholson came south in 1932, dividing time between Florida and southern Texas, before going to Atlanta about a year and a half ago.

He made several gifts to educational and religious bodies, including schools in Baroda, India, and Manila, Philippine Islands, operated by the Methodist church. He also endowed a chair of philosophy and Bible at Baker University, Baldwin, Kan., of which institution he had been a trustee since 1902.

Prior to entering the cement industry, Mr. Nicholson was a zinc manufacturer at Nevada, Mo., and Iola, Kan., also building smelters at Tulsa and Henryetta, Okla.

Surviving are his widow and a son, George A. Nicholson, of Kansas City.

Regional Cement Safety Meeting Well Attended

Representatives of Portland-cement plants in Kansas, Oklahoma, Nebraska and western Missouri held a regional safety conference recently at Independence, Kan., 175 persons attending. The conference was one arranged by the Portland Cement Assn. C. M. Carman, superintendent of the Universal Atlas plant at Independence was general chairman of the meeting.

Illinois Awards 1937 Contracts for Cement

The Illinois Department of Public Works and Buildings has contracted for its 1937 cement requirements, eight companies operating within the state sharing in the awards. The price averages $2.44 per bbl., about the same as paid by the state last year.

New Plant to Supply Aggregate for Bridge

★ The La Crosse Sand & Gravel Co. has opened a gravel pit and plant about one mile south of La Salle, Wis., on a 110-acre leased site, to provide material to be used in the $1,500,000 Mississippi River bridge close by.

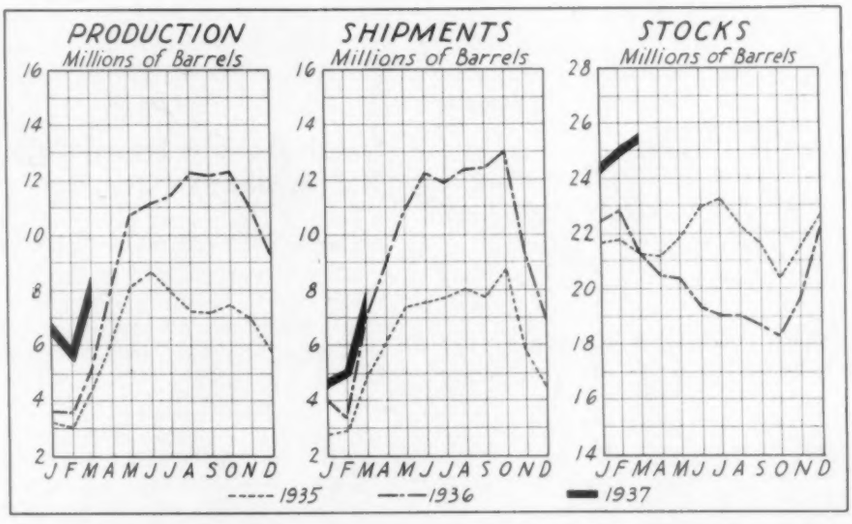
$100,000 Provided for State Cement Plant

OKLAHOMA PASSES MEASURE

After a heated argument over an appropriation for $750,000 for the erection of a state-owned cement plant the Oklahoma legislature finally passed the measure after whittling down the amount to $100,000 with the stipulation that this fund was to be expended for the establishment of both a "cement and asphalt plant."

Rep. John MacDonald of Durant, Okla., one of the ardent supporters of the measure to build a state-owned plant, was of the opinion that the smaller appropriation will be of little benefit in gaining the objective which he sought. "This appropriation ($100,000) is just like using a bucket of water to put out a big fire," he declared after passage of the measure.

★ A plaster mill with a capacity of 50,000 tons per year to cost $400,000 is to be built at Fort Dodge, Ia., by the National Gypsum Co., it is reported.



The Portland-cement industry in March, 1937, produced 8,443,000 bbl., shipped 7,879,000 bbl. from the mills, and had in stock at the end of the month 25,623,000 bbl. Production and shipments showed increases of 59.1 and 9.6 per cent. respectively, as compared with March, 1936. Portland-cement stocks at mills were 21.3 per cent. higher than a year ago.

F. T. C. Hears Price Discrimination Case

TO TEST LEGALITY OF DISCOUNTS

The Federal Trade Commission began hearings in the Robinson-Patman Price Discrimination case against the U. S. Quarry Tile Co. late in April. The hearings were held in New York and in Washington, D. C., and the presentation of testimony on behalf of the government has been finished. The defense will present its testimony in New York during May.

The case as presented by the government set forth that the so-called "functional" discount which is at issue began as a discrimination in 1919 but has since become such a fixed part of the economy of the tile business that it is accepted as a normal function of the industry. The government does not make the claim in its pleading in this case, but it considers that this habitual discrimination is so typical of many industries that the test of the legality of this "functional" discount in the U. S. Quarry Tile Co. case will have a decisive bearing upon business practices in many varied industries.

As presented by James J. Rooney, attorney for the F.T.C.,the case rests upon these facts: there are three sets of interests: (1) The manufacturers, who are willing to sell to the wholesale-retailers with a 15 per-cent. discount; and let them sell to the contractors or builders. In this way the manufacturer eliminates the risk of bad accounts by way of weak contractors. (2) The wholesaler-retailers (jobbers), most of whom (16 out of 24) located in New York, simply buy for the trade, and do not set tiles, or guarantee the quality of the work,or the stability of the accounts. (3) The contractors who set the tiles, and stand back of the quality of their work, are those who suffer the discrimination. In the hearing the contractor witnesses set up the claim that prior to 1919 the manufacturers dealt direct with the contractors or owners; but that when imported tiles became an important consideration the wholesaler-retailers came decidedly into the picture. Then the tariff stopped importation; but the wholesaler-retailers remained as a link in the business, and thereafter functioned almost solely in connection with domestic products with whose sale and distribution the contractors hold—and the government supports the contention —the wholesaler-retailers have nothing to do in so far as giving a needed and useful service is concerned.

The contractors allege the manufacturers now prefer to sell their goods to the wholesaler-retailers, and refuse to pay the contractors the 15 per-cent. discount in order to favor and to support the function of the wholesaler-retailers. The contractors introduced evidence from ultimate consumers to show that the practice was a discrimination at the expense of the customer of the contractor as well as of the contractor.

Eight witnesses were produced by the government. The proceeding was conducted by the F.T.C. Trial Examiner John W. Norwood. The U. S. Quarry Tile Co. was represented by Cable & Cable, of Lima, O., and by Covington, Burling, Rublee, Acheson & Sharp, of Washington, D. C.

The presentation of evidence by the defendants—called respondents in the terminology of the F.T.C.—is expected to be finished late in May.

New York Producer Makes Plant Changes

★ Installation of a soft-stone eliminator and other changes which have increased the annual capacity from 75,000 to 115,000 tons have been completed at the sand-and-gravel operations of E. M. Rumsey & Sons at Ithaca, N. Y.

Analysis of the material since the soft-stone eliminator was installed indicates that the finished material exceeds the specifications of the New York state-highway department.

Inland Lime & Stone Co. Resumes Flux Shipments

Shipping of limestone flux from the plant of the Inland Lime & Stone Co. at Port Inland, Mich., were resumed early in April.

Despite the presence of considerable ice in the upper lakes shipments of the stone to the plants of the parent company, the Inland Steel Co. at South Chicago, Ill., were made with little hazard or delay.

South Dakota Nonmetals Not Subject to Ore Tax

Nonmetallic-minerals of construction are not subject to the South Dakota ore tax according to a recent ruling of Attorney-General Clair Roddewig.

The ruling was made in response to an inquiry from Gov. Jensen of South Dakota.

★ The Northwestern Gravel Co., has started operations at a new all-steel crushing, washing and screening plant near Lake View, Ia.

Material is being shipped by motor truck to highway jobs in that vicinity.

Survey of Labor Conditions Ready

DATA AVAILABLE TO MEMBERS

The executive committee of the National Sand & Gravel Assn. met at the Willard Hotel in Washington on Friday, April 30. Consideration was given to a number of important problems now confronting the industry, with particular reference to labor relationships.

The committee received a summary prepared by the executive staff on the returns from the questionnaire submitted to member companies in February. Through the data developed by the questionnaire, the association is for the first time in a position to give member companies confronted with a specific labor problem, the benefit of the nationwide survey of the labor situation in the sand-and-gravel industry.

Forecast Rise in Cement and Aggregate Shipments

Portland-cement shipments will rise 16.1 per cent. in the second quarter compared with shipments for the months of April, May and June of last year according to the quarterly forecast of the Regional Shippers' Advisory Boards.

The forecast indicates a rise of 3.8 per cent. for sand, gravel and crushed stone and 14.2 per cent. for lime and plaster in the same period.

Illinois Stone Producers Buy Crushing Equipment

★ Sales of Model 3XC 30-in. by 30-in. crushers have been reported by the Chicago office of the Gruendler Crusher & Pulverizer Co. to Dolese & Shepard Co., McCook, Ill., and C. C. Macklin, Steward, Ill., both crushed-stone operators.

New Illinois Silica Plant Near Completion

★ The Saylor Silica Corp., has been formed with Carl E. Saylor as its head and a plant for the production of silica sand in the famed Ottawa district in Illinois is nearing completion on Bull's Island in the Illinois River. Leases have been signed for the island which is said to contain 60 acres of deposits in the St. Peter formation, averaging 275 ft. in depth.

Practically the entire output, after processing, will be shipped by barge to Chicago. Offices have been established at 165 West Wacker Drive, Chicago.

Plan Special Features For Lime Convention

INTERESTING PAPERS SCHEDULED

With special features planned for operating men, the annual convention of the National Lime Assn., to be held May 11 and 12 at the Drake Hotel, Chicago, promises to be one of the most interesting and best in the point of attendance in years.

Among the speakers will be Walter C. Voss, professor of building construction, Massachusetts Institute of Technology, and his assistant, Howard R. Staley, who will present an up-to-the-minute report on the research work on mortars, masonry, and concrete being done at that institution under the sponsorship of the N. L. A. Mr. Staley will discuss *The Bond Layer as Revealed by the Microscope* and Prof. Voss will talk on *Characteristics of Volume Changes in Mortars*. The discussion by Prof. Voss also will include a report on the vibration experiments, volume changes, and the function of lime in concrete.

Tying in closely with the existing economic picture will be an illuminating discussion entitled *What's on the Worker's Mind Today* by Whiting Williams of Cleveland, O., widely known industrial consultant, author and lecturer.

The association counsel, Abram F. Myers, will present a paper on *Current Trends in Federal Legislation*. Mr. Myers, in addition, will discuss the legal aspects of the current labor situation as well as a review of the Robinson-Patman Act. To those who have attended association conventions in recent years, Mr. Myers needs no introduction. His experience as chairman of the Federal Trade Commission well qualifies him to talk on legislation and industry problems related to the anti-trust laws.

Russell G. Creviston, director, advertising and sales promotion for the Crane Co., will discuss *The Selling Process*. He will talk on sales management as one phase of the selling process and the relation which it bears to the remainder of the selling job. Having found weaknesses on both sides, it will be Mr. Creviston's purpose to point out ways and means by which all phases may be strengthened to produce the most efficient results.

The Role of Lime in the Battle against Plant Diseases and Insects is the title of a paper to be given by Ray Hutson, head of the department of entomology, Michigan State College, Lansing, Mich. The tonnage of lime sold annually for the manufacture of insecticides and fungicides has shown a steady increase in recent years, which indicates the importance of such products. Mr. Hutson will present some detailed data on this use for lime which should be of great interest to many chemical lime producers.

Another discussion which lime manufacturers will want to hear is one entitled *Control Testing and Consumer Satisfaction* by H. N. Huntzicker, research department, United States Gypsum Co. This company recently completed a new laboratory building for the routine testing of its products and for research investigations. Mr. Huntzicker's paper will cover some aspects of laboratory control of production.

D. C. Henderson of The Winnipeg Supply & Fuel Co., Winnipeg, Canada, will speak on the firing of lime kilns with a mixture of producer gas and wood as fuel.

The experiences in getting a new rotary kiln plant into commercial production, with particular emphasis on the value of vertical stone pre-heaters, will be recounted by Theron C. Tayler, vice president of the Belle Isle Lime Co., Detroit, Mich.

New Silica Plant to Be Built in Ohio

★ Silica-sand operations are to begin shortly east of Newark, O., by the newly-formed Silica Products, Inc. James F. Park is head of the concern. Sand will be ground to various degrees of fineness from 140 to 350 mesh. The deposit consists of a quartz-like rock.

Bethlehem Steel Reopens California Flux Plant

With iron-and-steel production at its peak since 1929 demand for dolomite and fluxing stone are at a high level.

The dolomite quarry and crushing plant of the Bethlehem Steel Co. near Salinas, Cal., recently resumed production after a long period of idleness. The material is shipped to Bethlehem Steel's mills at San Francisco.

U.S.G. Booklet Explains Use of Lime in Farming

The United States Gypsum Co. is distributing a 24-page booklet entitled, *Lime on The Farm* to a large list of agriculturalists.

The booklet explains in a nontechnical manner various facts about lime which should prove of interest to farmers. Aside from its use as a soil corrector, many other farm uses for lime are described including the spraying of crops, seed treatment, water softening and use of the material in building construction.

Dept. of Labor Reports on Walsh-Healey Act

MAY REDUCE MINIMUM TO $2,500

The U. S. Department of Labor announces that during the first six months of administration of the Walsh-Healey Act, 1,608 contracts aggregating $93,598,652 were reported by 25 agencies of the U. S. Government to have been made in accord with the provisions of the Act. During this period, 43.4 per cent. of the contracts represented expenditures by three emergency organizations, and 47.8 per cent. by nine executive departments. About 52 per cent. of the business went for textile products, petroleum, iron and steel. Also included, but incapable of precise determination as to their relative importance, were contracts for sand and gravel, ready-mixed concrete, and crushed stone, mostly by purchases through the WPA.

The co-sponsors of the Act, Sen. Walsh and Cong. Healey, are still conferring with representatives of the Labor Department on proposed amendments to the act during the current session of Congress. It is known that many members of Congress resented the interpretations of the original act in the regulations promulgated by the Secretary of Labor, and showing a sign of this was an action of the House Appropriations Committee substantially reducing the department's proposal for funds to administer the Walsh-Healey Act. The acting comptroller general advised the Committee that he saw nothing objectionable in the regulations and the committee then reversed itself. If the Department of Labor can secure enough funds for effective administration, it seems clear that the $10,000 minimum now contained in the act will be reduced to $2,500, that the act will be modified to include stocks on hand, and that sub-contractors will be brought within the wage-and-hour provisions of the act.

Workers Walk Out in Eastern Cement Plant

Failure of officials of the Lawrence Portland Cement Co. to sign an agreement with the United Cement Workers of America, resulted in the calling of a strike at the Northampton, Pa., plant on April 7. The walkout affected approximately 270 mill and quarry employees.

According to union leaders, the company officials refused to negotiate with the union committee unless it was accompanied by an official of the American Federation of Labor, with which the cement workers are affiliated.

More States Rule on Occupational Diseases

INDIANA, WASHINGTON ACT

Occupational disease laws have been enacted at the 1937 sessions by the legislatures of two additional states—one by Indiana on March 6, 1937, and one by Washington on March 16.

The Indiana Workmen's Occupational Diseases Act (House Bill No. 169, Laws of 1937) follows in many respects the Illinois Workmen's Occupational Diseases Act which went into effect on Oct. 1 last year. It does not affect, but is to be enforced concurrently with, the Indiana Workmen's Compensation Act of 1929; it applies only to disablements occurring after the act becomes effective (as proclaimed by the governor), but does not extinguish any right of action under any existing laws for disablements occurring before that time.

Under the new Indiana law a right of action (the maximum death benefit, as in the Illinois act, being $10,000) is provided where an employee dies or sustains injury to health by reason of a disease contracted or sustained in the course of employment and proximately caused by negligence of the employer, unless the employer elects to provide and pay compensation as provided in the act. Occupational disease is defined as a disease arising out of and in the course of employment. No compensation is payable for or on account of any occupational disease unless disablement occurs within one year after the last day of the last exposure to the hazards of the disease, except that in cases of occupational disease caused by the inhalation of silica dust or asbestos dust, the period is three years after the last day or last exposure. The act sets out a schedule of compensations in the manner of the Workmen's Compensation Act, and the procedure of election or rejection by employer and employees, insurance, claims, disputes, and other matters. It is to be administered by the Industrial Board.

The Washington statute (Chapter 212, Laws of 1937, approved on March 16 and effective June 11, 1937), adds a section (Sec. 7679-1, Remington's Compiled Statutes) to the Washington Workmen's Compensation Act, providing that compensation shall be payable for disabilities sustained or death incurred by an employee resulting from occupational diseases enumerated. Among those specified are:

"(13) Miners' diseases, including cellulitis, bursitis, ankylostomiasis, tenosynovitis and nystagmus.

"(20) Dermatitis (venenata). Any process involving the use of or direct contact with acids, alkalies, acids or oils, or with brick, cement, lime, concrete or mortar capable of causing dermatitis (venenata).

"(21) And any persons employed in any industry where intense dust prevails."

The new Washington statute does not apply to any case of occupational disease in which the last injurious exposure to the hazards of the disease occurred prior to Jan. 1, 1937, nor "to any case in which such occupational disease was incurred in the pursuit of a prior employment to which a character of occupational diseases is incident different from those incident to the employment followed at the time the disability occurred." It is also provided that the employment of any person claiming under the new law must have been wholly within the state of Washington for three years immediately preceding the injury for which compensation is claimed, and during a substantial period of such employment subjected to conditions peculiarly conducive to such diseases. The increased cost in carrying out the provisions of the new law is to be borne equally by employer and employee.

Missouri Plant Contracts For Electrical Precipitators

★ The Marquette Cement Mfg. Co., has awarded a contract to the Western Precipitation Co., Los Angeles, for the installation of Cottrell electrical precipitators at the Cape Girardeau, Mo., plant. The installation will have a capacity of 150,000 cu.ft. per min.

Fire Damages Office of Southern Cement Plant

Early in April fire caused $25,000 damage to the plant-office building of the Southern States Portland Cement Co. at Rockmart, Ga. All the plant records and office equipment were saved, however. A temporary structure is being used pending the rebuilding of the office.

Montana Lime Producer Improves Plant Facilities

★ Approximately $10,000 has been spent in improving the plant of the Elliston Lime Co., near Elliston, Mont., to allow the production of pulverized and pebble lime.

Included in the equipment installed is an Aerovibe screen, a Raymond mill, three screw conveyors and a 35-hp. Diesel engine to supplement the present power system.

Cement Men Oppose Higher Freight Rates

RAILROADS LOSING TONNAGE

Expressing the view that the railroads have sustained an enormous loss of tonnage and revenue through establishment of high freight rates, cement producers went on record in opposition to proposed rate advances by the carriers in a hearing before the Interstate Commerce Commission at the Morrison Hotel in Chicago in April.

They asserted that present rates were high enough and that they had increased over a period of years. Movement of cement, they said, was "getting away" from the railroads and going to other forms of transportation by virtue of increases in rail rates since 1922. E. S. Gubernator, traffic manager of the Lehigh Portland Cement Co., who handled the case for the cement interests, pointed out that from $4,500,000 to $5,000,000 in annual revenues would accrue to railroads by rate increases on the commodity, on the basis of last year's traffic.

Shippers' testimony on the suggested advance in cement rates was made before Interstate Commerce Commissioner Clyde B. Aitchison.

The hearing was expected to extend through April 29, being confined to the views of shippers, at the conclusion of which carriers were to be given an opportunity to present their rebuttal. Decision on the proposed increases on basic commodity rates is expected to be made by the commission soon.

Witnesses appearing in behalf of cement interests were: D. S. Browder, Pennsylvania-Dixie Cement Co.; R. J. Mahon, Lone Star Cement Corp.; George Cole, Medusa Portland Cement Co.; E. W. Martindell, Ideal Cement Co.; J. B. Johnson, Jr., Consolidated Cement Corp.; and W. S. Barton, Ash Grove Lime & Portland Cement Co.

The report of the Lehigh Portland Cement Co. for the twelve months ended March 31, 1936, shows net profit of $2,318,054 after depreciation, etc., equal after deducting $406,769 dividends paid on the preferred stock to $2.67 a share on 716,123 common shares outstanding at the close of the period. In the year ended March 31, 1936, the company reported net profit of $626,701.

★ Eugene D. Kirkby and Howard R. Ward, of Detroit, Mich., are reported to have plans nearing completion for establishment of an $800,000 gypsum plant near Turner, Mich. The plant, it is said, will be similar in size to that of the National Gypsum Co. at National City, Mich.

Large Blast Made with New Type of Explosive

SCENE IS DYER, MONOCACY QUARRY

The largest blast using Nitramon made thus far furnished a test for this blasting agent at the John T. Dyer Co. trap-rock quarry at Monocacy (Berks County), Pa. The shot on April 17, which was designed to move approximately 250,000 tons of stone, is estimated to actually have brought down around 300,000 tons, using 54,463 lb. of Nitramon, a du Pont product.

Loading began April 14 and was supervised by du Pont technical men. Two tunnels at the bottom of the quarry 4 ft. by 4 ft. in section, and 10 well-drill holes at the top of the quarry were used. There were approximately six tons of stone for each pound of explosive displaced by the blast. Fragmentation was good so far as could be determined.

Tunnel No. 1 had an adit 56 ft. long with two laterals, the eastern lateral 40 ft. and the western lateral 98 ft. Tunnel No. 2 had a 50-ft. adit with an eastern lateral of 88-ft. and a western lateral of 60 ft. The length of the shot was estimated at 347 ft. with an average height of 120 ft. and burdens ranging from 50 to 90 ft. A total of 47,343 lb. of Nitramon was placed in the two tunnels, and the remainder in the well-drill holes.

The two tunnels were loaded in six hours. The cans of Nitramon were trucked from the car to the tunnel and "wheelbarrowed" into each unit of the load as needed. No stemming was used between the charge units. After the electric blasting caps were placed, backfilling of the adits was completed.

Ten well-drill holes varying in depth from 35 ft. to 113 ft. were loaded with from 8 to 43 cans of the explosive. Each hole was primed with a Nitramon primer and double-countered Cordeau. An electric blasting cap was connected at each hole to the Cordeau fuse. The caps from the well-drill holes were connected in with the circuit to the two tunnels, each of which had 14 caps per tunnel. All connections were in parallel.

Care was taken with warning signals for the blast, since there was a crowd of onlookers. A locomotive whistle blew three times after which a stick of dynamite was fired as a further warning. Fifteen seconds later the switch was pulled and the shot fired.

The tunnels moved out the rock as expected according to the plans of the technical men and results were said to be entirely satisfactory. There were 60 ft. between the east lateral of Tunnel No. 1 and the west lateral of Tunnel No. 2 and this 60-ft. gap apparently was cut through by the shot. Officials of the Dyer company stated the blast brought down approximately a year's supply of stone.

Building New Lime Plant On Nelson Island, B. C.

★ The International Lime Corp. is constructing a new lime plant on Nelson Island, 60 miles northwest of Vancouver, British Columbia. The limestone is said to contain less than 1 per cent. impurities, and the deposit is several hundred feet thick, according to Oliver Bowles, of the U. S. Bureau of Mines.

Recipients of Holmes Safety Awards Announced

Certificates of honor have been awarded by the Joseph A. Holmes Safety Assn., closely affiliated with the U. S. Bureau of Mines, for extraordinary safety achievement during the past year. Those plants in the nonmetallic-minerals industries thus honored are: American Agricultural Chemical Co., Pierce, Fla.; Columbia Quarry Co., Columbia, Ill.; the Birmingham, Ala., Iola, Kan., and Union Bridge, Md., mills of the Lehigh Portland Cement Co.; the Toledo, O., and York, Pa., plants of the Medusa Portland Cement Co.; Marquette Cement Mfg. Co., Cape Girardeau, Mo.; North American Cement Corp., New York; and Universal Atlas Cement Co., Duluth, Minn.

Petoskey Cement Tenders Banquet to Employees

Reviving an annual custom which was discontinued several years ago, the Petoskey Portland Cement Co. was host on April 8 to all employees of the company. Nearly 400 attended. A banquet was served at the Perry Hotel in Petoskey after which the crowd went to the Temple Theatre which had been reserved for the evening for a program of entertainment and speeches.

Basic Pay Increased By Cement Companies

Increased wages have been the rule throughout the various pit and quarry industries in recent months. Most of the cement companies have taken the lead initiated by the Universal Atlas Cement Co., a U. S. Steel Corp. subsidiary, in granting increases of approximately 10 per cent. The North American Cement Corp. increased its basic rate of pay from 48 c. to 57 c. per hr.

Developing Caves on Beaver P.C.Co. Property

WILL BE OPEN TO THE PUBLIC

Discovery of an extensive series of caves which are said to eclipse anything of a like nature for beauty and sheer magnitude in the Pacific northwest was made recently on the Marble Mountain quarry property of the Beaver Portland Cement Co. of Portland, Ore.

Immediately upon discovery the entrance was closed up but work is said to be going ahead, including the installation of electric lighting, steps and walkways and it is expected that the underground wonders will be made available to the public before long.

The discovery was made after a quarry blast. The company owns enough raw-material deposits so that the existence of the caverns will not affect its supply.

No Bids Received for Self-Unloading Boat

No bids were received for the sand-and-gravel steamer *Jupiter* when offered for sale by the United States marshal at Cleveland, O., recently to satisfy claims totaling $75,000.

The vessel, owned by the Great Lakes Silica Corp., went into service last year. (*P&Q*, Dec. 1936, p. 51-53) The company has a petition on file for reorganization under Sec. 77b of the federal bankruptcy act.

Cement Safety Winners in 1936 Suffer Accidents

Two Kansas cement plants, both possessors of Portland Cement Assn. safety trophies for no lost-time accidents during an entire year, had their hopes for a 1937 no-accident year dashed recently.

At the Independence plant of Universal Atlas Cement Co., Ed Kettleman of the construction crew suffered compound fractures of the jaw and left arm in an accident. Jordan Farnsworth, employed in the quarry of the Lone Star Cement Corp. at Bonner Springs lost his right thumb when it became caught in a drill.

Correction

In a story entitled *California Chemical's Magnesite Operations* (*P&Q*, April, 1937, p. 71-74.), reference was made to a "Riblett Construction Co. tramway." This should have been described as a Royal N. Riblet Airline Tramway.

Makers of Lime-Putty Perfect Organization

PRODUCERS DISCUSS OPERATIONS

The name of the new association of Brooks-Taylor lime-putty plant operators will probably be announced shortly by Irving Warner, president of the group, which met at Washington, D. C. late in March (*P&Q*, April 1937, p. 70.) Mr. Warner, together with vice-presidents E. S. Simpson and Durando Miller and Hayden Brooks, secretary, will also outline the policies and activities of the group in the near future. Consideration will also be given the proposal that the organization meet annually with the National Lime Assn., as suggested by that association.

Mr. Miller, vice-president of the Colonial Sand & Stone Co., New York, N. Y., and formerly head of the Blue Diamond Service Corp., at the Washington meeting described some of his experiences during his 15 years in the lime-putty field. His company recently installed the largest Brooks-Taylor plant in existence at New York. His company distributes entirely through dealers. Deliveries are made in a V-bottom-body dump truck. Unloading is accomplished by screen conveyor.

Mr. Simpson and John Redd of Washington reported their sales of lime-putty at the capital were increasing each month. Mixer trucks deliver the putty to the job, sand being added and mixed *en route*. After the proper amount of cement is added at the job any objections to workability have been overcome, they reported.

Mr. Brooks told of his experiences in the lime-putty field, first with the Blue Diamond process and later with the Brooks-Taylor process which he developed to control the consistency and increase the stiffness of the putty.

Mortar produced by the process is said to be less harsh and easier to work with than ordinary mortars.

Among the producers and equipment makers who attended the gathering were:

Irving Warner, Alexander Foster, Jr., Reed C. Bye, J. A. Murray, H. J. Whitten, Robert Collins and F. V. Haggerty, all of the Warner Co., Philadelphia, Pa.

E. S. Simpson, John Reed, S. D. Frazier, and Murray Simpson, all of the Super Concrete Corp., Washington, D. C.

Durando Miller, Colonial Sand & Stone Co., New York, N. Y.

C. L. Montgomery, Vermarco Lime Co., West Rutland, Vt.

Louis Richter, Richter Concrete Corp., Cincinnati, O.

Hayes M. Junkin, Knox, Strauss & Bragdon, Pittsburgh, Pa.

B. E. Reid, Goff-Kirby Co., Cleveland Ohio.

Stanley O. Smith and W. M. Smith, Concrete Construction & Supply Co., Columbia, S. C.

M. E. Smith, Chicago Bridge & Iron Co., Chicago, Ill.

Lee S. Trainor and W. V. Brumbaugh, National Lime Assn., Washington, D. C.

V. P. Ahearn, National Ready Mixed Concrete Assn., Washington, D. C.

C. D. McKinney, Gager Lime Mfg. Co., Chattanooga, Tenn.

W. F. Spenny, Best Bros. Keene's Cement Co., Washington, D. C.

Dr. L. S. Wells, Bureau of Standards, Washington, D. C.

Hayden Brooks, Brooks-Taylor Co., Birmingham, Ala.

California Firm to Make Lightweight Aggregates

The Basalt Rock Co. of Napa, Cal., is preparing to go into the business of producing light-weight aggregate on a large scale, it is reported.

A. G. Streblow, president of the concern, recently returned from a European trip where he made a study of light-weight aggregates. He also placed orders for equipment to be used in his company's lightweight-aggregate operations. This installation will be the first of its type in the United States, according to Mr. Streblow.

Fresno Operator Acquires Building Firm's Assets

The Grant-Service Rock Co. of Fresno, Cal., recently purchased the physical assets and good will of the Consolidated Construction Co. also of Fresno.

Properties involved in the sale included two asphalt plants, a small crushing plant, excavating equipment and concrete-mixing trucks. The Grant-Service concern is a $750,000 combine formed when the Grant Rock & Gravel Co. and the Service Gravel Co. were merged several years ago.

Core-Sand Producer in Road-Building Business

The Bridgeport Core Sand Co., Saginaw, Mich., which also engages in the road-building business has been awarded a contract for paving and constructing a parking area at the automobile-ferry landing at Mackinaw City, Mich.

Canadian Company Builds Roofing-Slate Plant

The crushing plant of Canadian Slate Products, Ltd., at Madoc, Ont., is now in partial operation and the construction of its roofing-slate building is under way. The company recently purchased additional deposits.

General Insulating Broadens Operations

ERECTS WOOL PLANT AT DUBUQUE

The General Insulating & Mfg. Co. of Alexandria, Ind., one of the leading American producers of mineral wool, is opening its third plant at Dubuque, Iowa.

Instead of using a native rock as raw material the Dubuque operations will employ blast-furnace slag. Construction and opening of the Dubuque plant was supervised by Charles Richardson, general manager of the company.

The company is also reported to have acquired 200 acres of deposits near Rockford, Ill., where it is anticipated another wool plant will be erected within a short time.

Construction Volume Up; Home Building Gaining

March construction in the 37 eastern states totaled $231,245,900 according to F. W. Dodge Corp. In February the figure was $188,257,300 while for March, 1936, the total was only $198,761,900. Of the March, 1937, figure $90,167,600 represented residential building, $88,601,500, went for non-residential building and $52,476,800 went into heavy civil engineering projects.

The March residential total was about 65 per cent. ahead of the total of $55,220,600 reported in this class for March, 1936.

Residential building gains over March of last year were shown in each of the major geographic districts without exception. The most important increases occurred in the Chicago territory (northern Illinois, Indiana, Southeastern Wisconsin, Iowa); in southern Michigan; in New England; in the Southeast; and in the Pittsburgh territory (Ohio, Western Pennsylvania, Kentucky, West Virginia).

Non-residential building gains over a year ago, where they occurred, were largely in private as distinguished from public jobs. Losses in total non-residential building from March, 1936 were concentrated in the Southeast, southern Michigan, the St. Louis territory, and Texas.

The Michigan State Highway Department has taken bids on its calcium-chloride requirements for the year 1937. Approximately 29,000 tons will be purchased for use as a dust layer and stabilizer on gravel roads throughout the state.

Proposed Diversion Bill Killed by Veto

GOVERNOR OF NEW JERSEY ACTS

In a strongly-worded message to the New Jersey legislature, Governor Hoffman has vetoed a bill which would have diverted $7,900,000 from highway funds to relief purposes. The diversion, stated the governor, reflected a "wanton disregard for human life, avoids an honest decision and definitely is not the answer to the financing of our unemployment relief problem." Furthermore, according to the governor, diversion of highway funds "will remove employment opportunities for our people. It will eventually withhold from over 10,000 heads of New Jersey families a chance to maintain their self-respect through earning an honest livelihood. Instead of giving work at a living wage in the construction of roads, representing a capital investment for the people who have paid for these highways, it will commit New Jersey to a policy of collecting moneys under false pretenses and spending them through the medium of a dole that will keep unemployed workers unemployed."

The U. S. Bureau of Public Roads, acting under the authority of the Hayden-Cartwright Act, has penalized the state of Maryland for using highway funds for non-highway purposes. This act provided that the Federal government may withhold as much as one-third of Federal-aid money due to a state when the state diverts highway funds. The allotment to Maryland was reduced $341,666.66, after the State had used about $400,000 of highway funds for other purposes (*P&Q*, April, 1937, p. 44).

According to an estimate by the National Highway Users Conference, at least $200,000,000 paid by motorists for construction and maintenance of highways will be used by state governments for non-highway purposes in 1937, unless constitutional or legislative restraints are adopted. Constitutional amendments making diversion impossible are being considered in Alabama, Delaware, Georgia, Idaho, Indiana, Maryland, New Jersey, North Carolina, Pennsylvania, South Dakota, Utah, and Washington. North Dakota has enacted an anti-diversion bill, and similar bills are being considered in New York and Wisconsin. Incidentally, more than 5,000 bills relating to ownership and use of motor vehicles have been introduced in state legislatures since January 1. Approximately 2,000 of the bills deal with special fees and taxes levied upon motorists.

As an illustration of the threats to continued employment growing out of diversion of highway funds, the Chief of the U. S. Bureau of Public Roads, in his last annual report, stated that road construction financed wholly or in part by Federal funds has provided 6,000,000 man-months of direct employment and, using the figure generally accepted of two men behind the line for each man directly engaged, it is evident that indirect employment growing out of Federal highway funds was approximately 12,000,000 man-months during the 3-yr. period.

Kansas City Gets First Mineral-Wool Plant

Louis Marino, president of the Beyer Crushed Rock Co. of Kansas City, Mo., has formed the Federal Rock Wool Co., with a capitalization of $50,000.

Construction is under way on a mineral-wool plant adjoining the plant and quarry of the Beyer company on Bannister Road and operations are expected to start about May 15. This will be the only plant of its type within 100 miles of Kansas City.

Oklahoma Lumber Firm Is Now Delivering Concrete

Ready-mixed concrete was introduced to the building industries of Ponca City, Okla., recently when the Baughman Lumber Co. of that place began producing and delivering the material. The concrete is proportioned at a central plant and mixed *en route* to the job in mixer trucks.

Building Gains Benefit Sand-Lime-Brick Plants

With the marked gains in building, the sand-lime brick industry is showing a marked revival this year.

The annual convention of the Sand-Lime Brick Assn. was held at Boston, Mass, recently and Harold J. Levine, National Brick Co., Long Island City, N. Y., was elected president. Other officers named were: H. D. Robertson, Harbour Brick Co., Toronto, vice-president, and J. M. Zander, Saginaw Brick Co., Saginaw, Mich., secretary-treasurer.

Blaze Causes Damage to Mica Workings in South

Fire recently damaged two units, including the kiln, at the new addition of the plant of the Victor Mica Co. at Spruce Pine, N. C.

Columbus Firm Adds New Concrete Plant

OUTPUT NOW 400 CU.YD. DAILY

The Mixed Concrete Corp., Columbus, O., is expanding its facilities with the construction of a new ready-mixed-concrete plant, according to Ralph H. Anderson, vice-president. The new batching lay-out involves the expenditure of about $25,000. Bins and other equipment are being supplied by the Erie Steel Construction Co., Erie, Pa.

This is the second proportioning plant for this concern and will give the company facilities for mixing and delivering 400 cu. yd. of concrete per day.

Basalt Rock Co. Enters Concrete-House Field

The Basalt Rock Co., Napa, Cal., is constructing four concrete houses in the low-price field. These will all have concrete floors, precast concrete ceiling joists and slabs, and those with gable roofs will have concrete shingles. Considerable public interest has been created and no doubt will result in a number of additional houses being built. The selling price will probably be less than $3,000.

Houston Firm Contracts for Lime-Putty Plant

★ The first lime-putty plant west of the Mississippi River is expected to go into operation early this summer at Houston, Tex.

The Black-Brollier Co. has purchased license rights for the Houston area from the Brooks-Taylor Co. and a standard two-tank plant is being fabricated at the Birmingham, Ala., plant of the Chicago Bridge & Iron Co.

Installs 2-Cupola Plant for Making Mineral Wool

R. W. Ross, formerly connected with the National Rock Wool Co., Lagro, Ind., has formed a new concern and is erecting a mineral-wool plant near Lagro. Two cupolas are being installed with provisions for additional furnaces later on.

The plant will be housed in a fireproof, steel and concrete building. A three-story warehouse is also being erected.

Production has been resumed after a long period of idleness at the bentonite plant of the Western Clay Products Co. at Hatch, N. M.

Editorial

Labor Relations

AMONG the many popular fallacies current in these times is the one that considers the question of labor relations a private problem. Not only is it a common belief that these relations concern merely the parties immediately involved, employers and workers, but on each of these two sides there is the notion that it is an individual problem in which not even the other side can have a comparable interest. This situation illustrates the difficulty of removing oneself sufficiently from the purely personal aspects of individual relationships to view them objectively. As in so many other cases, the problem is largely one of proper orientation.

The relations that exist between a single employer and even a single employee—to take the simplest of all possible cases—appear on close examination to be much less private and individual than they are believed to be. The employer looks upon the prospective employment of the applicant for the single position which he has open as a purely personal problem in which his objectives of maximum work output and minimum wage outlay seem to him to overshadow all other considerations. To the extent that the proposed employment meets these satisfaction standards which he has set up will the arrangement prove acceptable to him. On his part the worker takes a similar one-sided view, holding that minimum energy expenditure and maximum wage return are the ends that are important above all others. To the extent that any available job meets these satisfaction standards which he establishes will the arrangement prove acceptable to him.

If the proposed employment agreement does not meet the employer's standards, he may make overtures to, or accept an application from, some other prospective worker; and if it does not meet the worker's standards, he may apply for work to some other employer. These choices, commonly thought of as aspects of liberty or, in legal terminology, "freedom of contract", exist only when there are at least one other worker, whom the employer may engage if the first worker does not suit him, and at least one other employer, to whom the first worker may apply for work if he is not pleased with the first employer's terms. If there is no second employer, the worker is obliged to accept the proffered terms or starve; if there is no second worker, the employer is obliged to employ the worker on the latter's terms or perform the work himself.

Instead of being aspects of liberty or freedom of contract, however, these choices are merely evidences of the availability of opportunity, and this availability is dependent upon the willingness and ability of some other worker to perform the first employer's tasks and upon the willingness and ability of some other employer to engage the first worker's services. This dependence upon other persons for the exercise as well as the very existence of these opportunity choices is the first condition that removes the prospective employment agreement from the realm of purely private concerns, peculiar to either the first employer, the first worker, or to them both. The very moment that these alternate opportunities present themselves, and, even though they may remain only possibilities and never approach probability or certainty, the very moment that they are considered by and influence the decisions of either the employer, the worker, or both, at that very moment the proposed employment becomes a matter of public concern. Other employers who may bid for the services of the first worker will necessarily be influenced in their bidding by what the first employer has already bid or may bid for them, and for that reason have a very real interest in the proposed employment agreement. Similarly, other workers who may tender their services to the first employer will necessarily be influenced in their wage demands by what the first worker has already asked or may ask for his services, and for that reason have a very real interest in the proposed employment. The greater the number of possible employers and the greater the number of possible workers, the larger the number of persons who have an interest in the terms of the proposed agreement and the wider the public concern.

If the employer, because of his inability or unwillingness to meet the wage terms proposed by the worker, does not employ him and is therefore unable to deliver to his customers the products of the worker's labor which they have bought or stand ready to buy, the would-be purchasers remain unsatisfied in their desire to buy and consume, unless they can obtain the equivalent or substitute commodities from some other employer. If they purchase elsewhere, the first employer and his unemployed worker suffer the loss of the profit and wages that would have accrued from the diverted transaction, while the successful seller and his worker gain by the change.

IN like manner, if the worker, because of his inability to obtain satisfactory remuneration from the first employer—due to the lower wage demands of other workers, for example—remains unemployed or works for wages that are inadequate to meet his needs, his purchasing power ceases or is greatly impaired and he can not satisfy his desire for either the necessities or the comforts of life. In either event those who manufacture and sell the commodities he needs but can not buy, as well as those who would otherwise be employed by them to produce those commodities, suffer the loss of profit and wages which would have accrued from those transactions had they not been prevented or reduced by the inability of the first employer and the first worker to come to terms. In this situation all the gain passes to the first employer who was able to employ a worker at wages below the first worker's demands. So competitive employers and their workers find their own profit and wage opportunities influenced by the decisions made by the first employer and the first worker, and accordingly have an interest in the proposed employment

agreement. This is another way in which "private" matters acquire a public interest.

If the business of the first employer declines for any of the reasons mentioned, those who furnish him with raw materials, manufactured parts or supplies suffer a decrease in profits and their workers a decrease in wages. If competitive employers gain business and resultant profits at the expense of the first employer, their employees gain in more regular or more extended employment and earnings. They have, therefore, a very deep interest in what happens between the first employer and his worker, and they increase the number of those who are influenced by and, as a consequence, interested in the relations that exist between those two.

THIS is a very tedious, because elementary, review of some of the many ways in which employer-employee relations, thought to be purely personal and individual in nature, affect the material gains through profits and wages of all competitive employers and workers and all other employers and workers who are immediately dependent in any way upon the regular and continued working of productive forces. It has seemed necessary because of the inability of many persons, employers and workers alike, to realize that what they decide to do as between themselves has widespread effects and therefore can not be considered as a matter of private concern. The examples could be multiplied and many illustrations could be cited in a highly-complicated society like ours. Such an explanation would require an exploration of almost the entire field of economics and the demonstrable interrelationships between all divisions of industry and all classes of people. Enough has been said to indicate the direction of further thinking and to show the conclusion to which the evidence leads.

If we can accept that conclusion as warranted by this brief discussion, but especially if we can pursue the argument to greater lengths and justify it beyond logical and factual contradiction, we shall be prepared to take a more enlightened view of the many problems which are societal in character—wages, hours of labor, regularity of employment, collective bargaining, unionization, competitive trade practices, and the like—and to understand the share which each of us contributes as an individual to the creation of those problems and the share which each of us should contribute to their solution. We are paying the penalties—through strikes, lockouts, unemployment, terrorism, racketeering, public dissatisfaction, increasing government regulation, and the threats of unpleasant political changes—for our failure to understand; yet we seem to learn slowly, if at all, for the disturbing evidences of misunderstanding appear to increase rather than decrease, and many of us are allowing our natural prejudices to become more deep-seated, our animosities more bitter, and our resistance more stubborn.

There are many questions on which most of us could profitably do some serious thinking and many of them are inextricably bound up with the problem generally understood by the term "labor relations." One of the most pressing of these, made more important by the Supreme Court's recent decision involving the Wagner labor act, is that of unionization. Is unionization inevitable, not alone in our industries, but in all industries? If we believe that it is, what are we doing to fit ourselves intellectually, temperamentally and economically for the change? Will unionization tend to lessen or to increase the causes of friction between employers and workers? Will it improve the economic status of the workers, and, if so, would that contribute toward improving the economic condition of the country as a whole?

If unionization is inevitable, can we assist in directing its course, in giving it form, in establishing its principles? Is the industrial or the craft type of union more desirable for national ends, or may some other type, having the advantages but none of the objectionable features of these forms, be devised? Can employers coöperate with workers in placing the shaping of union policies and the control of union tactics in the hands of honest men? Would this be preferable to recurring conflict, intimidation, bribery, and blackmail?

Can we all as employers take a greater interest in the economic welfare of workers, others' as well as our own; and if we do not, are not we likely to be compelled to do so by group, governmental or other types of pressure? Is it possible, in our industries as well as in others, to rearrange production schedules and buyers' habits to such an extent that employment can be made more regular and continuous? Or, if that is not feasible, can alternate employment for slack seasons be provided by coöperative effort between employers in different industries? Is it socially desirable to leave this question to chance?

What is the right level for wages—hypo-subsistence, subsistence, or hyper-subsistence? Is public purchasing power important to the economic health of the country, and would it ultimately benefit our industries even though they do not produce the commodities whose purchase it would immediately make possible?

Can and should the hours of work be regulated? Continued technological improvement seems to indicate that unemployment will increase or that there will be a reduction in the number of hours worked by employees instead of in the number of workers. Which trend is desirable from a national standpoint, and might it be desirable to accelerate such a trend by making suitable readjustments? Could the burdens of enforced unemployment, due to seasonal declines or other causes, be softened by some plan of sharing with workers the gains of the increased use of labor-saving machinery, and would this tend to allay growing dissatisfaction on the part of those who suffer from the deprivation of income arising from those sources?

THESE are but a few of the many questions that will occur to anyone who looks at the "labor relations" problem objectively. If we admit that these are matters of public concern, then we must consider them not in the light of their immediate effects upon individual employers or individual workers, or upon individual industries or individual groups of workers, but as subjects of interest to everyone because of their effects on all classes of the population, upon all forms of industrial activity, and upon the future economic position of the country at large. It seems to have been true of these problems as of many others that "That which is everybody's business is nobody's business." Whether we like it or not, conditions are compelling us to take an interest in many things which most of us used to consider "the other fellow's worry." We are being forced to realize that we are members of society, of a living organism, whose general well-being is seriously disturbed and even, perhaps, endangered, by temporarily localized disturbances that have a latent capacity for spreading to heretofore unaffected parts of the body politic.

By PIT AND QUARRY'S
WASHINGTON OBSERVER

News and Views from the Capital

WASHINGTON is flooded with counsel and counselors about the effects of the labor decisions. Much of it is ill-informed or legalistic. This summary is an effort to present the ideas and deductions of responsible persons which seem to have the most permanent as well as immediate worth.

The Department of Labor people, from Secretary Perkins down, are making every effort to discourage discussions about further legislation to place more responsibility upon labor unions. It is fairly-well understood that Secretary Perkins' conference between labor leaders and industrial leaders produced no results. The labor leaders are said to have taken the attitude that it was the time for the industrial leaders to talk, and the industrial leaders were politely inarticulate. It is not expected the second conference will be much more effective.

The Congress is willing to offer bills to clarify the situation produced by the Supreme Court decisions, but the Labor Department counsels delay. The stated reason is given as the need to observe how the present law will work before new legislation is enacted. The real reason is said to be double-barrelled, first, the White House does not want any major legislation until the Supreme Court and government-reorganization bills are out of the way, and, secondly, it wishes the whole labor, hours, wages, labor-relations, trade-practice and monopoly issue settled in one bill by the commission to be created as suggested in Attorney-General Cummings' letter which embodies Donald Richberg's ideas.

It is doubtful, however, whether the Congress will submit to this program of suppression. It is quite probable that in the near future bills will be introduced requiring labor unions to incorporate and to function with the same responsibility assumed by other associations in business. There is a vigorous group in the Congress which believes such action is required because hours and wages and other advantages secured by labor are so rapidly hardening into a fixed part of national government practice that there is some serious likelihood that the entire machinery of labor unions may be absorbed by the government. Many lawmakers on the hill feel strongly that with recent developments and with the laws proposed it will soon be unnecessary to maintain labor unions. Labor leaders like Lewis and Green are said to be quite conscious of these probabilities, and for that reason they wish to conserve the advantages achieved, consolidate their positions as it were, and get everything in apple-pie order before what is regarded as the inevitable result comes to pass. Whether labor will take over government or government take over the regulation of labor, is one of the problems that also gives the political organism food for thought.

Naturally the actual history of the National Labor Relations Board itself, up to date, is now of intense interest to every one concerned with the problem. It has handled almost 2,500 cases which affect approximately a million working people. Orders concerning coercion, interference or restraint of employees in unionizing to bargain collectively are most frequently issued. The employer must neither encourage nor discourage union membership, nor must he meddle with the kind of union the employees organize, and he can not discharge an employee for any reason remotely connected with the employee's membership in a union. The board appears to be tolerant towards the employee in ruling in any case that involves union relationships. It must be recognized that the slightest implication that union activities have anything to do with a worker's discharge or layoff undoubtedly will be adjudicated in favor of the worker. A study of the rulings seems to make clear that the board is unlegalistic in judgment, and exercises apparently the sort of consideration that is symbolized by what the President called a layman's balance in summing up the budget.

It is interesting to know that in considering an employer's defense that an employee has been discharged for inefficiency the record of that employee is carefully checked in comparison with other employees who have been employed for the same period of time, who are similarly employed, and whose records probably may show the same mistakes and the same general character of inefficiency. The board seems to feel that length of employment does not indicate the positive quality of efficiency but indicates that any inefficiency existing has not warranted discharge. The point to remember is that the union worker always has the benefit of the doubt if his union affiliation is in question. It is also very clear that the board will not permit men to be laid off as punishment for union activities or affiliations, and that workers must be reinstated after a strike or shut-down without discrimination. In fact, the worker must be offered a job without applying for it if he has been unfairly discharged or laid-off, according to the judgment of the board. And it is illegal to prefer the members of one union over another, or pay one category more than another. In other words it is unlawful to make a contract with one union and shut out all other union members. The idea seems to be that one union may have the majority right to make the collective bargaining but that members of other unions willing to work under the same bargain have the right to a job. The employer, therefore, has no right to agree to close his shop against any worker willing to accept the collective-bargaining terms.

Espionage is classified as coercion, interference and restraint, and must not be practiced by an employer regardless of the use he makes of the spies' reports. Any form of intimidation is ruled as unlawful, be it refusal to deal with representatives not employed in the factory, or any influence to cause the employees to fear that they must lose their jobs or their seniority. Any publicity or propaganda employed to make the worker fear that he may lose his job is a violation of the act, according to a number of rulings.

"While there is now no constitutional objection to a federal law which requires employers to bargain collectively with the employees," declares Executive Secretary V. P. Ahearn of the National Sand & Gravel Association, "it should also be emphasized that the Wagner law does not require compulsory arbitration and, more important, the decisions do not require employers to yield to union demands. Employers should consider proposed contracts strictly from the standpoint of sound company policy and not because of any mistaken assumption that a federal law demands the execution of a contractural agreement with a union.

"Nothing requires the employer to sign any written agreement with his employees or with their representatives. The employer has a legal right to decline to deal with them until they have furnished reasonable evidence of authority. If for some reason a written contract of some kind must be negotiated, it is obvious that such a contract, for the time being, should not contain a provision requiring the discharge of non-union workers, and it should contain a provision setting forth that there shall be no coercion, restraint or discrimination by the union against non-union workers. That provision has already been sanctioned by the Congress in the Railway Labor Act which thus distinctly provides protection for non-union members against union members. All employees should be accorded the benefits accorded to union employees. Make contracts brief and specific, dealing with wages and hours, and leaving matters of detail to bulletin-board notices. Above all eliminate everything from the contract that might in any way interfere with the duties and responsibilities of management. The unions have no right to insist upon a share in the control of company policy."

The Walsh-Healey Act amendment, offered by the original authors, which has passed the Senate, reduces exempted contracts from $10,000 to $2,500, brings subcontractors and services under the terms of the act, and plugs up the hole which now permits filling government contracts out of stocks on hand. Incidentally, the Department of Labor has created a special bureau for the supervision of the enforcement of the Walsh-Healey Act. There will be 85 persons in the Washington office, and an unnumbered staff of investigators in the field.

The House passed the Pettengill bill to repeal the "long-and-short-haul" clause of the Interstate Commerce Act despite the opposition of the entire membership of the Interstate Commerce Commission. The bill is now in the Senate Interstate Commerce Committee where it is expected to remain until the present legislative jam is broken.

Senator Walsh, Massachusetts, introduced a bill to amend the National Labor Relations Act so as to empower any majority of employees belonging to a particular craft to demand the right to bargain collectively on behalf of their craft union in addition to the right already bestowed upon any majority group of employees to make the same demand. The amendment will place members of the A. F. of L. in a position to bargain separately in any industry where other industrial unions have a majority representation.

One of the most interesting and startling bills awaiting action in the Senate Judiciary Committee is Joint Resolution 117, introduced by Senator Bankhead, brother of the speaker of the House. It proposes an amendment to the Constitution of the United States and to the basic law of each separate state, giving the Congress and the government of each separate state the power to regulate the production, manufacture, transportation, and distribution of industrial and agricultural commodities in or between the states and with foreign countries. It makes the Congress the sole judge of this commerce, and gives it and each state the power to regulate maximum hours of work and minimum wages. The bill is said to have the sympathy of the White House group.

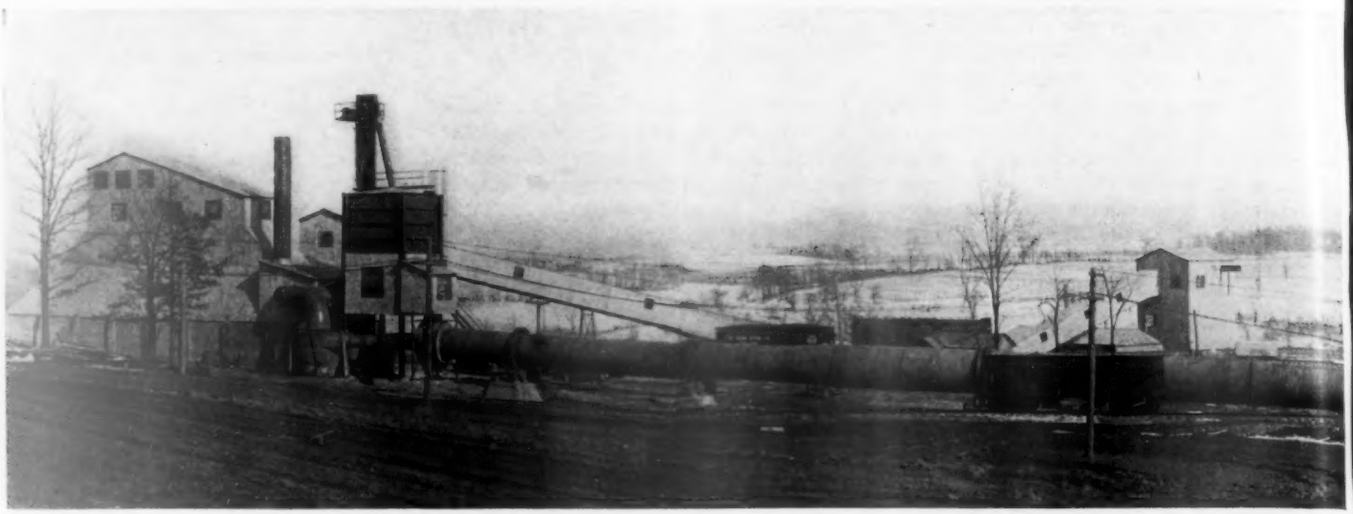
A Bureau of Industrial Economics will be created in the Commerce Department if the Shepherd-Robinson Bill becomes law. It has already had a favorable hearing before the Senate commerce committee, and is now in hearing before the House Interstate and Foreign Commerce Committee. The effect of the bill will be to create an organization of agents and bureaus headquartered in Washington, similar to the county agents and local agricultural experiment stations upon which rests the smooth-functioning machinery of the Bureau of Agricultural Economics and other agencies of the Department of Agriculture. The bill provides that the various bureaus or stations shall conduct researches, or investigations, or experiments, bearing upon problems involved in the production, manufacture, preparation, distribution, use, financing and marketing of products and services of commerce and industry, including "the establishment and maintenance of a permanent and efficient business structure, and such economic investigations as have for their purpose the development and improvement of the standard of living of the people of the United States." Free use of the mails would be bestowed upon the organization, and ultimately the operation of this new government unit is to have a base appropriation of $5,000,000 per year. While the plan seems almost made to order for the purposes of Assistant Commerce Secretary Draper and Donald Richberg, who seek a new instrument of regulation either in addition to, or as a substitute for, the Federal Trade Commission, it is opposed by the Bureau of Foreign and Domestic Commerce of the Department of Commerce, which fears that it would be wiped out by the new organization.

Representative Burdick, North Dakota, has introduced a bill prohibiting the use of the terms "U. S.", "United States", "National", or "Federal" as part of a trade name, trademark, or the name of a privately-owned firm or corporation. It may be used only, if this bill becomes law, when the government owns 51 per-cent. of the stock of the corporation and controls its direction. All persons or corporations now using the terms are to abandon them not later than July 1, 1939. Failure to do so is to be punished by a year in a federal penitentiary. Every county in the United States, it is said, has a commercial firm that uses at least one of these terms and, therefore, many protests are expected. The bill is believed to be the result of the action of the Federal Trade Commission in issuing cease-and-desist orders to concerns charged with using similar terms in wrongfully implying some connection with the government.

Representative Wright Patman, of the Robinson-Patman Act and the Soldiers' Bonus, has launched an organized drive with 200 members of the House behind him, to empower the United States to take over the twelve Federal Reserve banks. Under the Patman plan the government would buy all the stock owned by member banks, acquire all the assets, records and property of the Federal Reserve system, place its supervision with the Treasury, and use the earnings now going to private banks to reduce taxes.

The Treasury is the principal stumbling block in the way of material modifications in the surtax on undistributed earnings. Having guessed over $600,000,000 short in expected tax income for this fiscal year and being confronted with other problems, it opposes the change of any law that concerns taxes. However, many leading members of the House and Senate believe the tax is unjust and retards prosperity, and are in favor of amendments, so that firms may add to their working capital, replace depression losses, expand capacity, bring inventories to normal, make replacements, improvements, and repairs, reduce borrowings, retire debts, replace

(Continued on page 66)



By W. E. TRAUFFER

400-FOOT ROTARY KILN

THE new plant of the Chemical Lime Co., near Bellefonte, Pa., marks the first full application of cement-plant production and control methods to the commercial-lime industry in this country. The outstanding feature of this plant is the 400-ft. rotary kiln which is probably the longest and promises to be one of the most efficient and economical lime-burning units in existence. Other features of this operation include the simplified type of stope mine, the economical handling methods, and the application of direct-firing and

The 50-hp. motor driving the super-limit load kiln-draft fan.

advanced combusion control of the kiln. Accurate automatic control of all the factors entering into the calcination of the lime makes possible the production of a consistently-high quality of product. Mechanical handling throughout and the small amount of rehandling are also features.

The Chemical Lime Co. came into being in 1907, when Plant No. 1 was built. Plant No. 2 was acquired in 1930. It became evident several years ago that these plants were approaching

View along kiln looking toward stone end of plant. Transfer house and conveyor from secondary crusher house at right.

the time when they would be unable to meet the rapidly-growing demand for high-calcium chemical lime. Actually the production of the old plants has been oversold for several years. Rather than enlarge the old plants it was decided to build a large new rotary-kiln plant designed especially to produce pebble lime for the chemical and other industries.

In order to accomplish this purpose, the company effected a complete financial reorganization and applied for a Reconstruction Finance Corporation loan of $720,000 to finance the construction of such a plant and the purchase of the necessary additional deposits. This loan was granted in March, 1936, and was augmented by additional funds from private investors. Before this loan was granted a thorough study of this project was made by the R. F. C., and R. D. Gardner, supervising engineer for this body, was of great assistance to the lime company in the development of the mine and plant during both the design and construction stages. Construction was started on June 1,

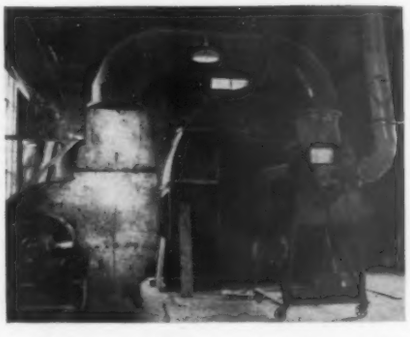
Automatically-controlled pan-feeder at feed end of kiln.

The rotary kiln above extends from the stone screening plant at the extreme left almost to the lime-storage silos at the right.

AT CHEMICAL LIME PLANT

View along kiln looking toward the lime-screening building above the lime-storage silos and the grinding-and-loading structure.

1936, and the first lime was calcined March 1, 1937. The stone plant went into operation somewhat earlier in order to fill the stone bins and supply stone for Plant No. 2. The lime-grinding plant was put in operation May 1.

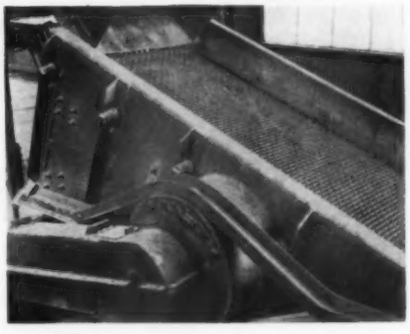


Fan, burner and hood at the firing end of the kiln.

The lime plants in the Bellefonte area form a major source of employment for its citizens and the building of this new plant has been, and its operation will continue to be, a great benefit to the community. The company's officials state that well over $150,000 was paid out in wages during the development of the mine and the construction of the new plant.

The mine is expected to produce 1,000 tons of rock per 8-hour shift working on a 5-day week, which is sufficient to supply the needs of the new plant, No. 3, and of the two older plants. About 300 tons of stone is diverted daily to these plants for shaft kilns and for the manufacture of pulverized limestone. The new rotary kiln has a capacity of 200 tons of pebble lime in 24-hr., requiring about 400 tons of stone. The pebble-lime storage and screening plant can size and load out 50 tons per hr. of finished material, and the lime-grinding unit has a capacity of 4 tons per hr. of material which will pass 90 per cent. through 200-mesh. Pebble lime for chemical and industrial uses is the principal product. The pulverized quicklime produced will be sold chiefly to the chemical and building trades. The hydrating is at present being done at Plant No. 1. All the products are being sold under the "Kno-Kore" brand.

The plant was designed by officers of the Chemical Lime Co. in consultation with the engineers of the several companies supplying the important plant and mine equipment. The company developed its general plans with the advice of these engineers in joint conferences in order to get the benefit of their combined experience and knowledge. Robert S. Walker, vice-president of the company, was in full charge of the construction work; L. E. Koontz was engineer in charge of the detailing of plans.



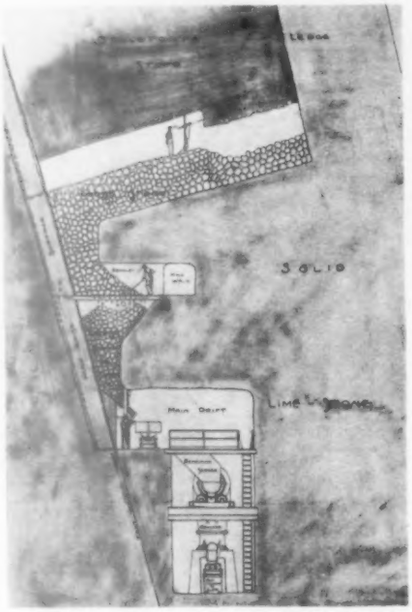
Final sizing of stone is done by this 4-ft. by 6-ft. vibrating screen.

The concerns which co-operated in the design of the plant and supplied the major equipment include the following:

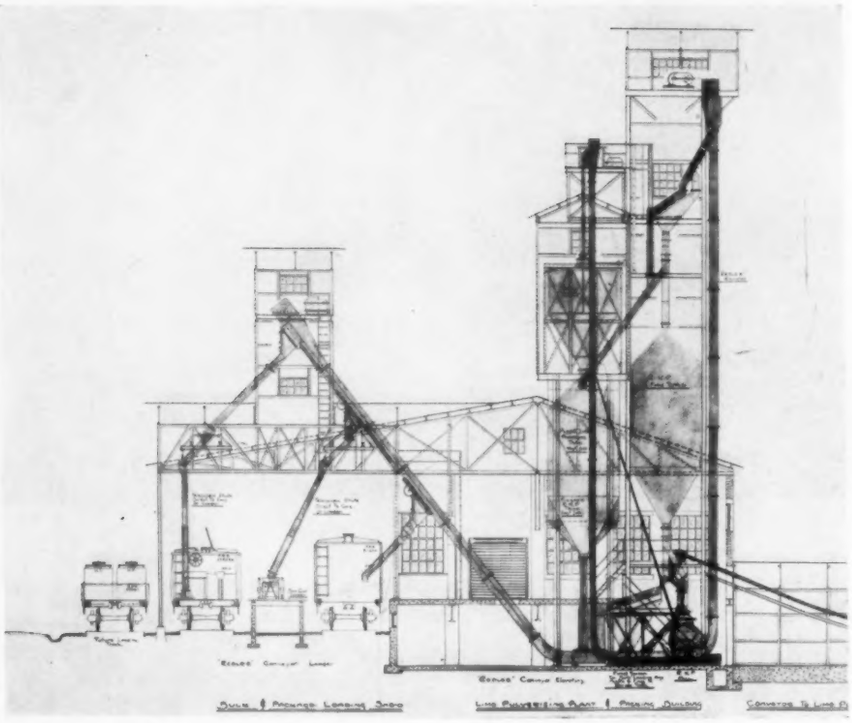
The Buffalo Forge Co. furnished the three kiln fans for primary and secondary air and for induced duft.

The General Electric Co. supplied all the electric motors in the plant, the plant main switchboard and the automatic electric systems which control the operation of the kiln.

The Ingersoll-Rand Co. supplied the air compressor, the wet drills, the mine loaders, the drill-sharpening equipment, and the mine pumps



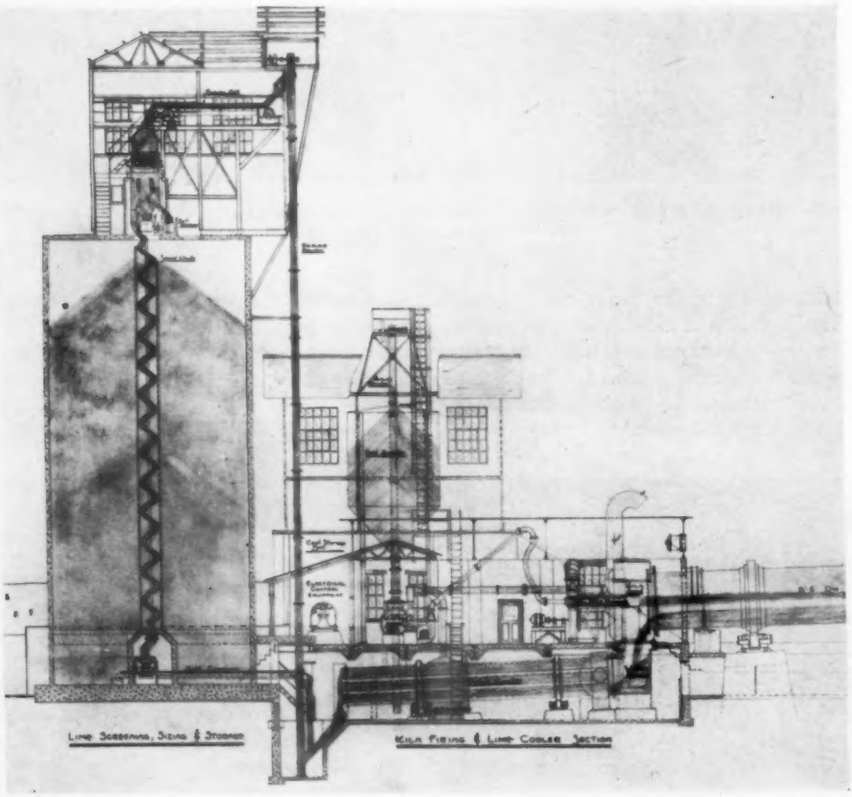
Cross-section through shrinkage stope, chute and main drift, illustrating mining method.



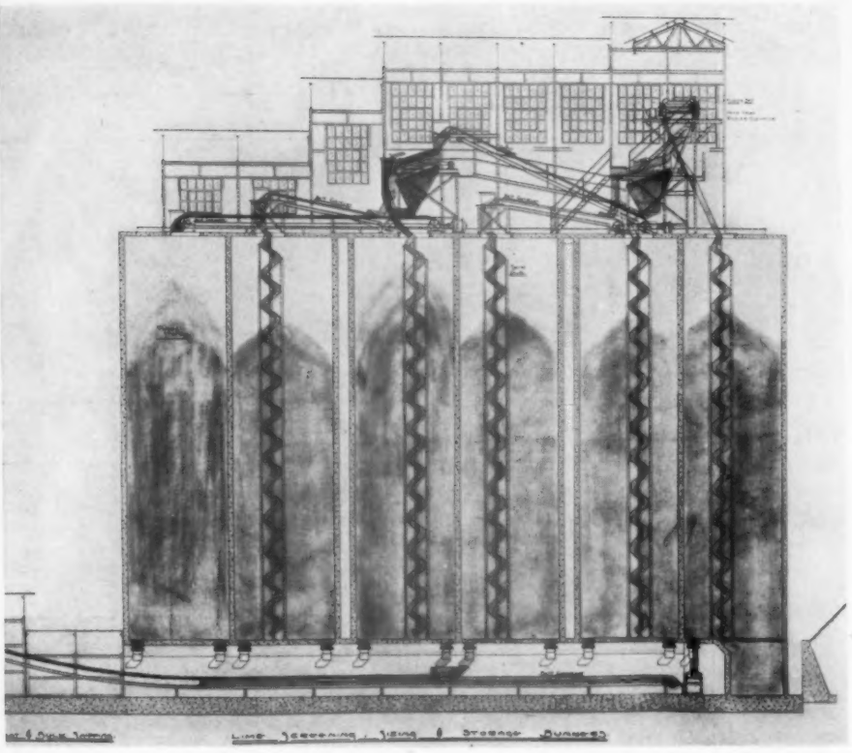
Cross-section of lime-pulverizing and packing building showing grinding mill, separator, screens, and systems for loading bulk and packaged lime.

Starting to drill a hole in the mine with one of the wet-type air drills.

Three-drum electric hoist which operates scraper in the mine, discharging to car below.



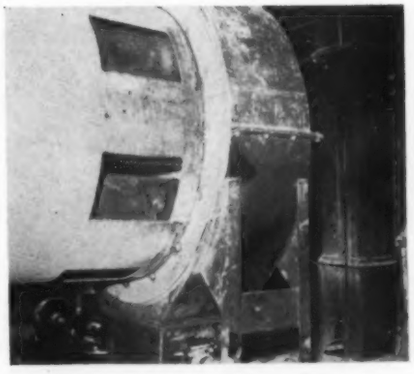
Cross-section of equipment lay-out at firing end of kiln, showing coal-pulverizing and burning system, cooler, picking belt, screens and spiral chutes.



Section through lime-storage plant showing screening equipment, belt-conveyors, spiral chutes and conveyor to shipping building.

Hoe-type scraper operating in the development of the mine.

Secondary gyratory crusher which reduces 6-in. stone to 2½ in.



Discharge end of muffled-type tube cooler with elevator to screening building at right.

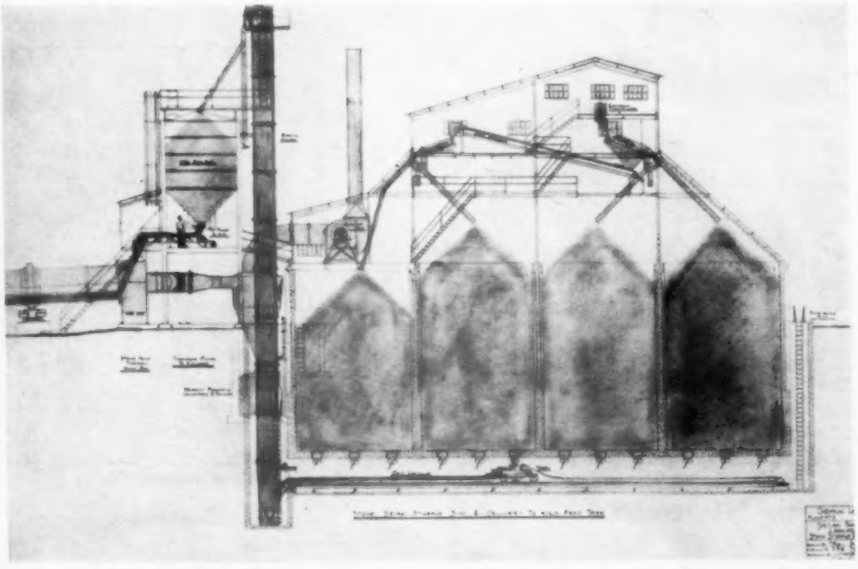
The Kennedy-Van Saun Mfg. & Engineering Corp. supplied the pulverized-coal system and lime ball-mill, the two kiln-dust cyclones, the pneumatic dust-handling system, and the kiln-coal and stone-feed tanks.

The Robins Conveying Belt Co. furnished all the belt-conveyors in the mine and the stone plant and the four vibrating screens and the bucket-elevator on the latter.

The Stephens-Adamson Mfg. Co. furnished all the lime-handling and conveying equipment including the Redler conveyors and elevators, the belt-conveyors and the vibrating screens.

The Traylor Eng. & Mfg. Co. supplied the rotary kiln and cooler, the Cheesman burner, and the primary and secondary crushers.

The Scranton Electric Construction Co. represented the General Electric Co., the Ingersoll-Rand Co. and the Buffalo Forge Co. in the equipment furnished by them and especially in devising the automatic electric-control systems.



Cross-section at feed end of kiln showing stone bins, screens, surge tank and pan-feeder delivery to the rotary kiln. Dust cyclones and conveying system are also shown.

In designing this new plant full provisions were made for future expansion and additions. Space was left for a second rotary kiln and the other equipment necessary, a limestone-pulverizing plant, a hydrating plant, shaft kilns, and a warehouse. The existing plant is very flexible in operation and each of its major departments can be operated independently of the others. This eliminates the necessity of halting all the operations in the case of a delay in any one department.

The plant and mine are located about 4 mi. southwest of Bellefonte and 1,000

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE CHEMICAL LIME CO., PLANT NO. 3, BELLEFONTE, PA.—PART I.
(Key numbers refer to corresponding numbers on accompanying flow-sheet.)

Operation	Key No.	Equipment	Make	Model No., Size, Capacity or Type	Power Source	Drive
First Sizing of Stone		(From mine conveying and crushing system under construction)				
	1	Conveyor	Robins	Belt, 30-in. by 480-ft., 18-deg.	50-hp. G. E. motor	Foote reducer
	2	Conveyor	Robins	Belt, 30-in. by 480-ft., 18-deg.	50-hp. G. E. motor	Foote reducer
	3	Screen (6-in. to 9-in. to 3a, 2½-in. to 6 in. to 3b, minus 2½-in. to 4)	Robins	Gyrex, 4-ft. by 8-ft., 1-deck, 2½-in. and 6-in. openings.	5-hp. G. E. motor	V-belt
	3a	Bin (To cars for plant No. 2)				
Secondary Crushing	$3b_1$	Bin		20-ton steel		
	$3b_2$	Secondary crusher (To 4)	Traylor	No. 7½ gyratory	50-hp. G. E. motor	Belt
Second Sizing of Stone		(From 3 and $3b_2$)				
	4	Conveyor	Robins	Belt, 24-in. by 180-ft., 12-deg.	25-hp. G. E. motor	Foote reducer
	5	Screen (Minus ⅜-in. to 5a, ⅜-in. to 2½-in. to 6)	Robins	Gyrex, 4-ft. by 6-ft., 2-deck, ⅜-in. openings on bottom deck	3-hp. G. E. motor	V-belt
	5a	Bin (To cars for plant No. 2)				
Final Sizing of Stone		(From 5)				
	6	Conveyor	Robins	Belt, 24-in. by 50-ft.	10-hp. G. E. motor	Foote reducer
		Magnetic pulley	Dings			
	7	Screen (1¾-in. to 3-in. and 1¼-in. to 1¾-in. to 8, ⅜ to 1¼ to $7a_1$)	Robins	Gyrex, 4-ft. by 6-ft., 2-deck, 1¼-in. and 1¾-in. openings	5-hp. G. E. motor	V-belt
	$7a_1$	Conveyor	Robins	Belt, 16-in. by 35-ft.		Foote reducer
	$7a_2$	Screen (Both products to 8)	Robins	Vibrex, 4-ft. by 6-ft., 1-deck, ¾-in. openings	5-hp. G. E. motor	V-belt
Storage and Feeding of Stone		(From 7 and $7a_2$)				
	8	Bins (4)		Concrete, 25 ft. square by 40 ft. deep, 1,000-ton capacity		
		Feeder	Robins	Traveling belt type	3-hp. G. E. motor	Gearmotor
	9	Conveyor	Robins	Belt, 18-in. by 105-ft.	15-hp. motor	
	10	Elevator	Robins	Bucket, 103-ft.	15-hp. motor	
	11	Bin		160-ton steel		
	12	Feeder	Webster	Pan, 18-in. by 14-ft.	5-hp. G. E. motor	Foote worm-gear reducer and Whitney chain
Calcining and Cooling		(Stone from 12, primary air and coal from A6)				
	13	Kiln	Traylor	Rotary, 400-ft. by 8½-ft. by 7-ft., all-welded	60-hp. G. E. variable-speed motor	Gear reduction
					Auxiliary K. R. Wilson gasoline engine	Direct-connected
	14	Cooler	Traylor	Rotary, 42¼-ft. by 7-ft., multiple-tube, indirect	5-hp. G. E. motor	Falk reducer
		Draft fan (Hot air to A_1 and B_1)	Buffalo Forge		15-hp. G. E. variable-speed motor	Direct-connected
	15	Elevator	Stephens-Adamson	Redler, 13-in. by 100-ft., 9 + 25-ton per hr. capacity	15-hp. G. E. motor	Foote reducer
	16	Conveyor (Night run to 21, otherwise to 17)	Stephens-Adamson	Belt, 42-in. by 17-ft. picking	3-hp. G. E. motor	Foote reducer
Pebble-Lime Screening, Handling and Storage	17	Screen (Oversize to 21, intermediate to $17a_1$, fine to 18)	Stephens-Adamson	4-ft. by 6-ft., 2-deck.	3-hp. G. E. motor	V-belt
	17a	Conveyor (To 21)	Stephens-Adamson	Belt, 20-in. by 18-ft.	Tail pulley of 18	Silent chain
		(From 17)				
	18	Conveyor	Stephens-Adamson	Belt, 20-in. by 33-ft.	5-hp. G. E. motor	Foote reducer
	19	Screen (Coarse to 21, intermediate to 19a, fine to 20)	Stephens-Adamson	4-ft. by 6-ft., 2-deck	3-hp. G. E. motor	V-belt
	19a	Conveyor (To 21)	Stephens-Adamson	Belt, 20-in. by 14-ft.	5-hp. G. E. motor	Foote reducer
	20	Conveyor (To 21)	Stephens-Adamson	Belt, 20-in. by 35-ft.	Tail pulley of 19a	Silent chain
		(From 16, 17, 19 and 20)				
	21	Silos (3) (Night run to 21a, sized lime to 22)		30-ft. diameter by 66-ft., 4,200-ton total capacity		
	21a	Conveyor (Night run to 15)	Stephens-Adamson	Belt, 20-in.	5-hp. G. E. motor	Foote reducer
Pebble-Lime Sizing, Handling, and Shipping	22	Conveyor (To 23 or 27)	Stephens-Adamson	Belt, 24-in. by 140-ft.	5-hp. G. E. motor	Foote reducer
	23	Screen (Oversize to 32, undersize to 24)	Stephens-Adamson	4-ft. by 8-ft., 1-deck	3-hp. G. E. motor	V-belt
	24	Elevator (To $24a_1$ or 25)	Stephens-Adamson	Redler, 13-in. by 82-ft.	15-hp. G. E. motor	Foote reducer

(Continued on facing page)

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE CHEMICAL LIME CO., PLANT NO. 3, BELLEFONTE, PA.—PART II.
(Key numbers refer to corresponding numbers on accompanying flow-sheet.)

Operation	Key No.	Equipment	Make	Model No., Size, Capacity or Type	Power Source	Drive
Pebble-Lime Sizing, Handling, and Shipping (cont.)	25	Screen (Oversize to 26, undersize to 24a$_1$)	Tyler	Hum-mer, 4-ft. by 6-ft., 1-deck	Motor-generator set	
	26	Tank (To 24a$_3$ or 27)		10½-ft. diameter by 40-ft.		
	27	(From 22 and 26) Conveyor (Pebble lime to cars for shipment)	Stephens-Adamson	Redler, 15-in., 21-ft. horizontal, 65 ft. at 45 deg.	20-hp. G. E. motor	Foote reducer
Lime Pulverizing, Separating and Packing	24a$_1$	(From 24 or 25) Tanks (2)		10½-ft. diameter by 40-ft.		
	24a$_2$	Ball-mill	Kennedy-Van Saun	4-ft. by 9-ft., air-swept	50-hp. G. E. motor	Philadelphia reducer
	24a$_3$	(From 26 and 24a$_2$) Elevator	Stephens-Adamson	Redler, 7-in. by 62-ft.	5-hp. G. E. motor	Foote reducer
	24a$_4$	Separator (Rejects to 24a$_2$, fines to 24a$_5$)	Gayco	10½-ft., mechanical	10-hp. G. E. motor	V-belt
	24a$_5$	Tank		10-ft. diameter by 40-ft.		
	24a$_6$	Bag-packer	Valve Bag Co.	2-tube	5-hp. G. E. motor	
Coal and Primary Air		(From railroad cars)				
	A1	Track hopper		Concrete, 200-ton		
	A2	Elevator	Stephens-Adamson	Redler, 7-in. by 58-ft.	5-hp. G. E. motor	Foote reducer
	A3	Bin (Coal from A3, hot air from 14)		50-ton, steel		
	A4	Ball-mill	Kennedy-Van Saun	4-ft. by 9-ft., air-swept	75-hp. G. E. synchronous motor	Philadelphia reducer
	A5	Fan	Kennedy-Van Saun	8-in. by 30-in.	10-hp. G. E., d.-c. variable-speed motor	Direct-connected
	A6	(Secondary air from B) Burner (Primary air and coal to 13)	Traylor-Cheesman			
Secondary Air	B1	(Hot air from 14) Fan (Secondary air to A6)	Buffalo Forge	Size 6 Duplex Conoidal	15-hp. G. E. d.-c., variable-speed motor	Direct-connected
Kiln Draft and Dust Recovery	13a$_1$	(Dust and hot gas from 13) Cyclones (2) (Dust to 13a$_2$, gas to 13b)	Kennedy-Van Saun	11-ft. diameter		
	13a$_2$	Conveyors (2) (To cars for shipment)	Kennedy-Van Saun	Pneumatic, 6-ft. diameter, 7-ton capacity each		
	13b	(Gas from 13a$_1$) Fan (Gas to stack and atmosphere)	Buffalo Forge	Type SL, size 12, Super Limit-Load	50-hp., d.-c., variable-speed motor	Direct-connected
Compressed Air		Compressor	Ingersoll-Rand	Imperial Type 10, 12½-in. and 20-in. by 14-in.	200-hp. G. E. motor	

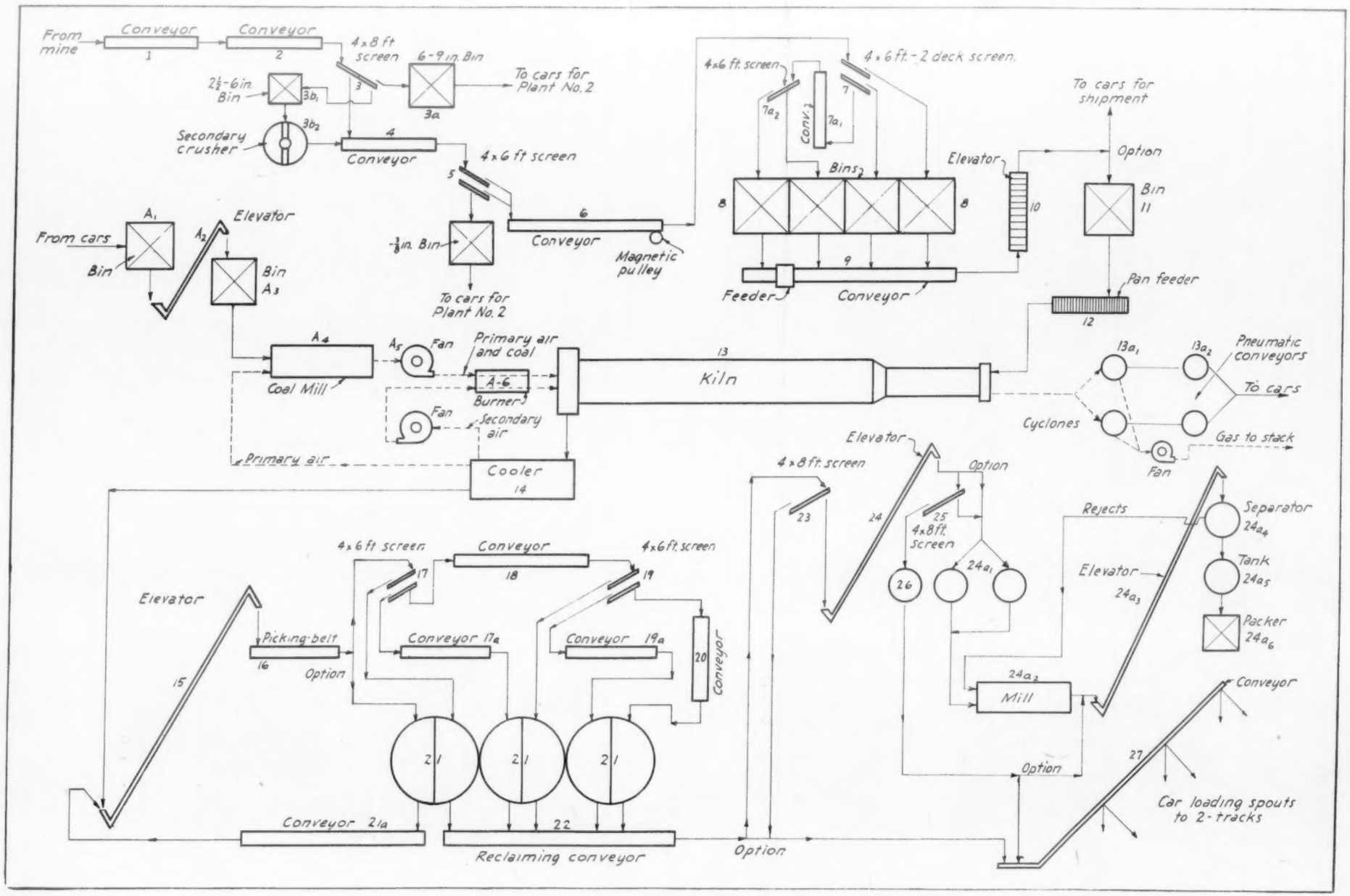
ft. from Plant No. 2. Their location on high ground makes them free from the danger of the floods which periodically interefere with the operation of other plants located in the valley. The plant is about ½ mi. from the Bellefonte Central Rys. line and a siding was built by the company to connect with the railroad.

The limestone is mined from the Bellefonte or Trenton ledge which has for years been the source of the raw material for much of the high-grade lime sold to the chemical industries. The ledge stands at an angle of about 70 deg. from the horizontal and is from 70 to 80 ft. wide and several thousand feet in depth. This stone is high-calcium with an average carbonate content of over 99 per cent.

The mine, which is now in its secondary stage of development, is a typical simplified shrinkage-stope form of operation similar to that employed by the American Lime & Stone Co. (P & Q, March, 1937, p. 63) in the same ledge. All the handling of the stone in the mine is done mechanically, and the economical belt-conveyor system of transfer will be used throughout when the development will have been completed. Finnish miners familiar with this method of mining were brought in from the mining district of the northern peninsula of Michigan for the development and operation of this mine.

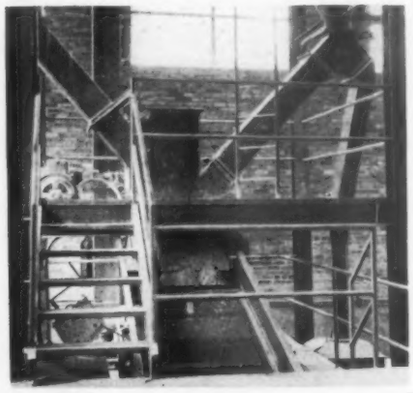
The mine level is being established at an approximate depth of 400 ft. below the surface, and an 18-deg. slope 1,000 ft. long was first sunk to the mine level. This slope is 9 ft. high and 14 ft. wide and for some distance below the portal is lined with concrete. Wherever water seepage was noted, the walls and ceiling were lined with Gunite. In addition to the belt-conveyors, this slope has a stairway and a hoist car for transporting men and materials between the surface and the mine. This car is operated by a Stroudsburg Engine Works single-drum hoist driven by a 40-hp. motor.

The main drift is being developed at right angles to the slope, in an east-and-west direction, and material and man "raises" are being driven to the shrinkage-stope level which intersects the slope above the drift level. In this variation of the overhand-stoping method limestone is blasted down from the roof and stopes 250 ft. high and 250 ft. wide and the full thickness of the ledge with five material-delivery chutes are being developed from this level. These stopes will be separated by 50-ft. pillars. In these stopes the stone blasted down occupies more space than it did in its natural formation and periodic shrinkage of the pile is necessary to give the miners at the top headroom for themselves and their tools. This shrinking will be done from below by drawing off the rock through material "raises" into bulldozing chambers entered from the manwalk, where the stone will be passed through a grizzly into pockets from



Flow-sheet of the operations of the Chemical Lime Co., Plant No. 3, Bellefonte, Pa.

which arc gates and a movable pan feeder will deliver it on a horizontal belt-conveyor. This conveyor will discharge into a Traylor 6-ft. by 12-ft. heavy-duty revolving manganese-wire screen having 9-in. openings. The oversize will be discharged into a Traylor 16-in. gyrator crusher with its opening set at 3 in. The minus 9-in. stone coming from the screen and the 3-in. material from the crusher will drop on a 220-ft. cross belt-conveyor on a slope of 18 deg. This belt will discharge the stone on the main conveyors running to the surface. These main conveyors are in operation and the screen and crusher have been installed but are not yet in use. Ingersoll-Rand wet drills and 40-per cent. Hercules ammonia explosive are being used.

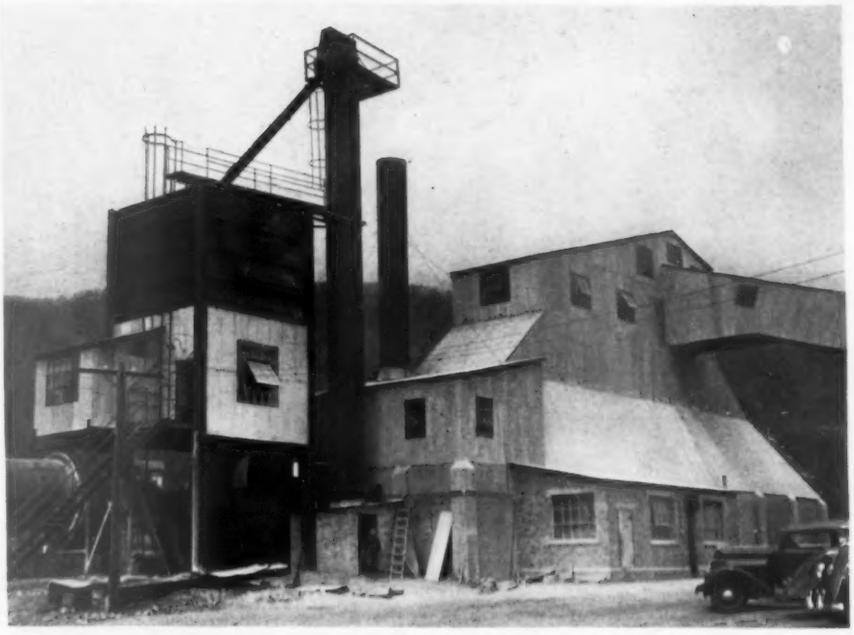


Vibrating screen in lime-grinding and packing department. Elevator in background.

Until the secondary development work is sufficiently advanced for this permanent handling system to be completed, a temporary system to the main conveyor is in use. Stone or "muck" is now being loaded by Ingersoll-Rand electric scraper-type loading machines into 2½-cu.yd. cars which are hauled by a Mancha 5-ton electric locomotive to the foot of the slope. Here the stone is being sledged through a 9-in. rail grizzly into a hopper feeding a 100-ft. inclined belt-conveyor. This temporary conveyor feeds the minus 9-in. stone to the first of the two 480-ft. permanent main conveyors.

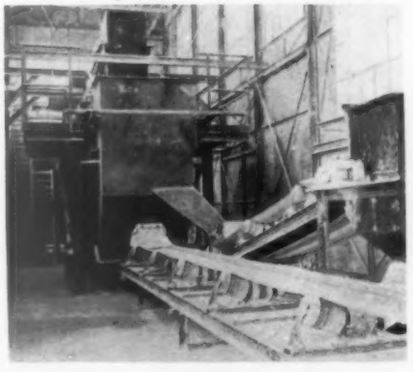
The mine is being ventilated through a 20-in. pipe by fans with a capacity of 10,000 cu.ft. per min. As soon as a man "raise" is pushed through to the surface, natural ventilation is expected to be adequate. Two Ingersoll-Rand pumps driven by 40-hp. electric motors drain the mine from a sump. Each pump has a capacity of 275 gal. per min. against a 400-ft. vertical head.

The second main conveyor from the mine discharges the minus 9-in. stone on a Robins Gyrex 4-ft. by 8-ft. vibrating screen which has 2½-in. and 6-in. openings on a single deck. The 6-in. to 9-in. stone is chuted into a 20-ton steel bin from which it is hauled to the shaft kilns at Plant No. 2. The 2½-in. to 6-in. stone drops into a bin from which it is fed to a No. 7½ Traylor gyratory crusher. The minus 2½-in. product of this crusher and the undersize from the screen are combined on a belt-conveyor which is inclined at 12 deg. and discharges in a transfer house on a Robins Gyrex 4-ft. by 6-ft. double-deck vibrating screen. The top deck is used only to relieve the load on the ⅜-in. bottom deck. The minus ⅜-in. material drops into a bin from which it is hauled to Plant No. 2 for the manufacture of ground-limestone products. A narrow-gage industrial railroad 1,000 ft. long was installed to serve this plant. The hauling equipment consists of an 8-ton Plymouth locomotive and 4-cu.yd. Western dump cars.



View showing feed end of kiln, cyclones, feed bin, stone elevator and stone-screening building.

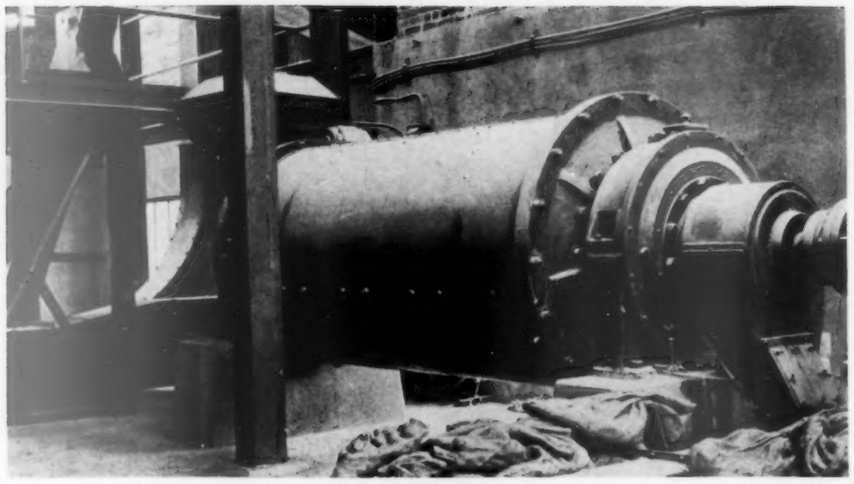
The ⅜-in. to 2½-in. material coming from the screen drops on a belt-conveyor which carries it to the screen-house. A 20-in. Dings magnetic head pulley on this conveyor removes any tramp iron. The stone is discharged on a Robins Gyrex 4-ft. by 6-ft. double-deck vibrating screen which has 1¾-in. and 1¼-in. openings. The two coarse sizes produced are chuted into storage compartments. The undersize (minus 1¼-in.) is carried on a short inclined belt-conveyor to a Robins Vibrex 4-ft. by 6-ft. single-deck screen which has ¾-in. openings and whose two products also drop into storage.



Screens and conveyors which distribute quicklime to the silos.

Main belt-conveyor from secondary crusher to transfer building.

The raw-stone storage consists of a group of four reinforced-concrete bins 25 ft. square and 40 ft. high with capacities of 1,000 tons each. The four sizes of stone are used to make four sizes of pebble lime. Stone is discharged from these bins through Robins Gates on a Robins traveling belt-feeder over a reclaiming belt-conveyor operating in a tunnel running under the bins



The air-swept 4-ft. by 9-ft. ball-mill which grinds the lime. Conveyors and elevators are seen in the background and in foreground at right.

and throughout their full length. This conveyor drops the stone in a Robins belt-bucket-elevator which discharges it into a 160-ton steel kiln-feed bin, which has sufficient capacity for 8 hr. operation of the kiln. A Webster horizontal pan-feeder driven by Whitney chain and a Foote worm gear reducer, discharges the stone from this bin into a spout feeding direct into the kiln. The elevator can also discharge on a chute for loading the bin stone into cars, when it is desired to empty the bins. This option also makes it possible to sell sized stone, if this should ever be desired.

The Traylor 400-ft. rotary kiln is said to be the longest all-welded kiln in existence. It is 8½ ft. in diameter for the first 300 ft. from the firing end and tapers in a 10-ft. section to 7-ft. diameter for the remaining 90 ft. of its length, which forms the preheating zone. The large-diameter section is made of 1-in. and ⅞-in. plate and the 7-ft. section of ¾-in.-plate. The kiln has six rider rings, each supported on two single bronze-bearing rollers, and has a pitch of ½ in. per ft. Lifters in the feed end prevent spillage and each end of the kiln is fitted with sealing rings. The kiln is driven by a 60-hp. d.-c. variable-speed motor through a Traylor gear reducer. An auxiliary power unit consists of a K. R. Wilson Co. Ford V-8 industrial power unit connected to a Foote reducer with a clutch. The kiln was shipped in five sections and they were welded together after the kiln was placed in position.

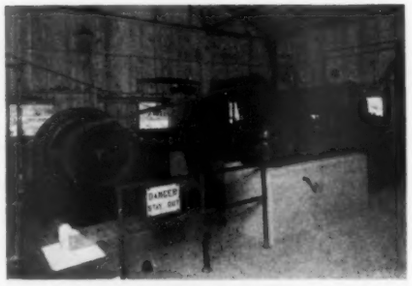
The kiln is lined with General Refactories 70-per cent. alumina brick and the 200-ft. section nearest the firing end is insulated with Johns-Manville Superex 2 in. thick. Johns-Manville insulating cement is used. Sample hole plugs are spaced 10 ft. apart for the length of the kiln and there are two standard manholes for repairs. Three thermocouples, placed 210, 250, and 290 ft. from the firing end, are connected to a Leeds-Northrup indicating pyrometer.

Elevator which carries coal from track hopper to mill-feed bin.

Motor driving the kiln through gear reducer. Auxiliary gas-engine clutch at the left.

The outstanding feature of this kiln is the introduction of the raw stone into the comparatively-low temperature of 500 deg. F. In a period of about 3 hr. the temperature of the stone is gradually brought up to about 2,200 deg. In the last 50 ft. of the kiln a 2,000-deg. temperature is maintained to offset the loss by radiation after calcining and to give a curing or soaking-pit effect. This slow calcination also reduces the amount of stone breakage or disintegration in the kiln and the resulting dust loss. The slow and controlled calcination produces a consistently-high quality of lime. Combustion control and the length of flame necessary to achieve the results mentioned are obtained by maintaining the proper admixture of the fuel and air and by the adjustment of the primary and secondary air in the quantities and at the intervals required. This extension of the calcining zone also provides more opportunity for the escape of CO_2.

A Buffalo Type SL Super-Limit Load, size 12 fan at the feed end of the kiln supplies the induced draft. It is driven by a variable-speed motor and has a range of output up to 40,000 cu. ft. per min. The hot gases are drawn by this fan from the kiln through two 11-ft. Kennedy-Van Saun cyclones, which precipitate the dust, and the air and gas are released to the atmosphere through a steel stack. The precipitated dust enters a Kennedy-Van Saun pneumatic-conveying system consisting of two 6-ft.-diameter containers with a capacity of 7 tons each. This system loads the dust into cars for sale as pulverized limestone.



The 12½-in. and 20-in. by 14-in. air compressor, 200-hp. motor and aftercooler.

A highly-volatile local coal is received in hopper cars and is discharged into a 200-ton track hopper. A Stephens-Adamson Redler elevator transfers the coal into a 50-ton steel surge bin from which it is fed into the coal mill. This is a Kennedy-Van Saun 4-ft. by 9-ft. air-swept ball-mill equipped for direct firing. Preheated primary air with a temperature of about 500 deg. F. is drawn from the lime-cooler hot-air reservoir and through the mill by a fan and is introduced into the kiln with the coal through the inner pipe of a Traylor Cheesman burner. A Buffalo Size 6 Duplex Conoidal fan also draws secondary air from the cooler hot-air reservoir at about 800 deg. F. and blows it into the kiln through the annular space between the inner and outer pipes of the burner. Coal is ground to a fineness of 90 per cent. through 200-mesh. The

fuel ratio of this kiln is now above 5 to 1 and a figure approaching 6 to 1 is expected when all the adjustments are made and the kiln is operated at normal capacity.

The calcined pebble lime is discharged from the kiln into a new type of Traylor rotary cooler 42¼ ft. long and 7 ft. in diameter. This cooler is of the indirect-cooling type with seven 16-in.-diameter tubes extending throughout its full length. The lime enters these tubes at a temperature of about 2,000 deg. F. and leaves them at about 200 deg. F. The cooling air enters the cooler shell around the tubes and leaves the shell without dust as it does not come in contact with the material. This indirect-cooling method allows the use of a high air velocity which improves the cooling efficiency, and it prevents hydration of the lime in the cooler when the humidity of the cooling air is high. A concrete-lined pit under the kiln has been provided to make possible the removal of the cooler tubes when necessary.

The pebble lime is discharged from the cooler into a Redler elevator which has flexible controls giving capacities of either 9 or 25 tons per hr. as desired. The lime is discharged on a Stephens-Adamson picking belt where any undesirable material is removed. During the night run lime may be discharged from this conveyor through a by-pass chute into one of the storage compartments below; but ordinarily it is discharged on a Stephens-Adamson 4-ft. by 6-ft. double-deck screen with 1¾-in. and 1¼-in. openings. The large size of pebble lime is discharged to storage and the second size is taken to another compartment on a short belt-conveyor. The undersize lime drops on an inclined belt-conveyor which discharges it on a second screen of similar description, but with ¾-in. openings on one deck and ⅜-in. and ⅛-in. on the other. To prevent breakage sized pebble lime is delivered to silo storage by means of Holmes spiral chutes.

Regrinding a drill bit in the shop.

The three reinforced-concrete silos supporting this screen building are 30 ft. in diameter and 66 ft. high and have a total capacity of 4,200 tons. Each silo is divided in two equal parts by a vertical partition.

The night-run pebble lime is fed by a gravity chute from its bin compartment to a short belt-conveyor which discharges it into the Redler elevator receiving the cooler product. Sized pebble lime is drawn from storage on a horizontal reclaiming belt-conveyor which is inclined at its discharge end to unload into a split chute. One leg of the chute discharges the lime into an inclined Redler conveyor which loads it into cars for bulk shipment. The other leg discharges on a 4-ft. by 8-ft. Stephens-Adamson single-deck vibrating screen from which the oversize material is discharged into the loading Redler.

Photo-electric cell which controls rate of feed to the kiln.

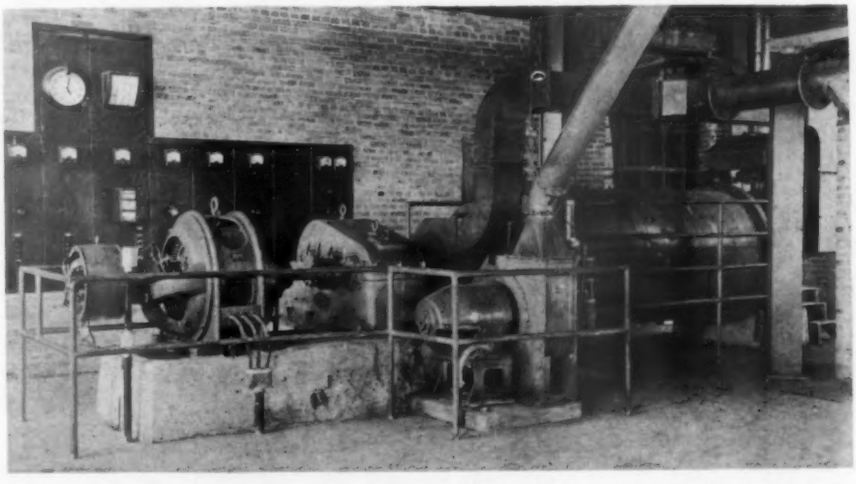
The fine product of this screen is dropped into a second Redler elevator which discharges it into a split chute. One leg of this chute discharges into two 10½-ft. diameter by 20-ft. 60-ton steel storage tanks. The other leg discharges on a 4-ft. by 6-ft. single-deck Hum-mer screen from which the fines also are discharged into the storage tanks. The material retained on the Hum-mer screen is discharged into a third storage tank of the same size from which package shipments of pebble lime are made. Lime can also be discharged from this tank to the loading Redler, when it is desired to clear the tank for a special-sized product.

Officials and operating executives of the Chemical Lime Co. Top row (left to right): M. W. Ardary, timekeeper; W. J. Emerick, treas. and ass't. sec.; R. S. Walker, vice pres. and gen. mgr.; S. H. Smith, gen. supt. Bottom row (left to right): W. J. Ward, chief chemist; Paul Emerick; Bayard Magee, maintenance engineer; R. D. Cheesman, combustion engineer.

Under the storage tanks is the 4-ft. by 9-ft. Kennedy-Van Saun ball-mill which is driven through a Philadelphia speed-reducer. A Redler elevator feeds the mill product into a 10-ft. Gayco mechanical separator. The rejects from the separator are returned to the mill and the product is discharged into a fourth 60-ton steel tank which feeds a 2-tube Valve Bag packer.

The loading Redler is so arranged that it can load into cars at 3 points on either of two tracks through telescoping steel spouts. The first and shortest spout can load only into box-cars on the first track. The other two spouts can load into any type of car on either of the two tracks. With this system a car can be completely loaded from one spout without being moved and a car

(Continued on page 70)



Coal mill with feeder at right—motor, reducer and fan at left—control board on back wall.

By V. P. AHEARN
Executive Secretary
National Sand & Gravel Assn.

THE POLITICAL SCENE IN WASHINGTON*

WHILE a multitude of bills were enacted into law during the seventy-fourth Congress, it is probably true that the most important of these to industry were the Social Security Act, the Walsh-Healey Act, and the Robinson-Patman Act. I shall discuss these in the order named, so far as their general principle is concerned, and at the same time will attempt to indicate the probable course of action on amendment or expansion of these bills during the present session. These three major enactments are of interest not only from the standpoint of public policy but also as to their conformity with constitutional powers of the Congress.

The Social Security Act.—This revolutionary experiment by the federal government in a purely social field was unquestionably the most popular piece of legislation enacted in many years. I believe that all of you are generally familiar with the requirements which it imposes upon the employer and upon the employees, but many fail to recognize the tremendous impact of this legislation upon the national economy. Even if the present law is not changed by the addition of larger taxes or by increasing its scope to embrace agricultural and domestic workers, it will ultimately require the annual payment in taxes of $4,000,000,000, a sum which equals the revenues of the Federal government during the past fiscal year.

Notwithstanding this heavy charge upon income, I am confident that industry approves the objectives of the measure, but the undeniable fact remains that so long as we are engaged in a competitive system the Social Security Act, by taxing employment itself, is certain to have the effect of stimulating the duty of management constantly to effect reductions in the cost of operation. This may ultimately result in a decrease of employment, giving to only a privileged few the benefits of the Social Security Act. Such a result would have grave social consequences, and there would be grim irony in a law which, although designed to improve the condition of employees, had the effect of limiting work opportunities and of increasing the cost of living.

With the possible exception of its unemployment compensation insurance provisions I believe that the Social Security Act will survive the constitutional test. There is no immediate prospect of substantial amendment of the act in the seventy-fifth Congress, although many proposals for change will be offered. Many look with concern upon the accumulation of the tremendous reserves required by the act and suggest that the impounding of such a huge sum of money will not only tempt the Congress to expand appropriations but will also have a paralyzing effect upon business activity. There is impressive support for the proposal that Federal obligations under the act should be met by current taxes and by current appropriations, and while such a change will probably not be made this year, when dispassionate consideration of the act becomes possible this substitute plan may be adopted.

The Walsh-Healey Act.—It is safe to assume that this important legislation can not be successfully challenged in a constitutional sense. There is not even a remote possibility of its relaxation during the present session of the Congress, and there is every probability that the act will be enlarged in scope and effect. . . .

In its present form it applies only to direct contractual relationships with the federal government, and subcontracting is not affected except by a requirement that no part of the contract shall be performed under conditions prejudicial to the health or safety of the workers. Individual contracts of less than $10,000 are exempt, but where exemption does not apply, the contractor is required to observe an 8-hr. day and a 40-hr. week, to pay a rate of one and one-half times the regular hourly rate for time worked in excess of these daily and weekly limitations, and to pay wages previously determined by the Secretary of Labor to be fair and equitable for the industry in question. Only those regularly engaged in the business which forms the subject matter of the contract, either manufacturer or dealer, are eligible to bid. This latter provision was aimed at bid peddling and bid shopping and has commanded the approval of legitimate industry.

An effort will be made in the present session to reduce the present minimum to $2,500 and, if a practical solution of the administrative difficulty can be devised, to extend its operations to subcontracting.[1] It is hardly a secret that several members of the Congress are not pleased with the methods employed by the Secretary of Labor in putting the act into effect. When it was presented for consideration last year, the objections of some members were eliminated by the provisions that the act should not apply to commodities ordinarily purchasable in the open market and, furthermore, that existing geographical wage differentials would be observed by stipulating that the findings of the secretary in this regard should be based upon local prevailing wages. Neither of these injunctions has been obeyed by the secretary. The open-market exemption was construed to mean that if the contracting officer was required by law to advertise for bids, the act would apply, thus making the exemption run to the manner in which the contract is let rather than to the commodity which the federal government was purchasing. The first wage determination by the secretary established a uniform national wage for the men's clothing industry, which immediately aroused resentment in certain congressional quarters . . .

The Robinson-Patman Act.—So far as the field of influence is concerned, there appears little doubt that this act represented a proper exertion of federal power. Reduced to its essentials, the act narrowed the allowable defenses to charges of price discrimination. Compliance with the act is an individual responsibility, but business management is faced with the most serious obligations in complying with the law. Drastic penalties are imposed for commercial practices heretofore entirely legal, including civil suits for treble damages by all aggrieved parties and, as to certain business conduct, criminal penalties may be assessed.

The Robinson-Patman Act has been subjected to legitimate criticism on the score that it is vague and ambiguous, and while it is impossible for anyone

* Presented at 1937 annual convention of the Rock, Sand and Gravel Producers Association of Northern California, Fairmont Hotel, San Francisco, Cal., March 18, 1937.

[1] See page 53 for later developments.

to give a detailed statement of the meaning of the act for application to all transactions, I suggest that the following test be applied to any set of facts to determine whether the act has been violated:

(1) Is there a discrimination in price?

(2) Is interstate commerce affected?

(3) Is the discrimination with respect to goods of similar grade and quality? If not, the discrimination is not unlawful.

(4) Did the price discrimination make due allowance for demonstrable differences in cost of manufacture, sale or delivery?

(5) Is the discrimination merely the exercise of a seller's legal right to select his own customers and to refuse to sell to others?

(6) Is the discrimination protected by that provision of the act which gives the seller the right to meet competition?

(7) Finally, what is the effect of the discrimination? If it does not (a) substantially lessen competition, (b) tend to create a monopoly, or to (c) injure, destroy, or prevent competition with any person who either grants or knowingly receives the benefit of such discrimination, or with customers of either of them, there is no unlawful discrimination.

The validity of the Robinson-Patman Act depends upon the extent of the power of the federal government under the commerce clause of the constitution. This has produced the mistaken assumption in some quarters that if a shipment does not cross a state line, the act will not apply. While this is the presumptive criterion of the effect of the commerce clause, it is not universally true. The Supreme Court has often stated that it can not give a categorical definition of the commerce clause, but has insisted, as in the Schechter decision, that the distinction between interstate commerce and intrastate commerce is clear in principle and that the precise line will be drawn as individual cases arise. The federal government may exercise control over intrastate commerce if such control is necessary to protect interstate commerce. I recognize the inconclusiveness of this statement, but it will serve to suggest to members of our industry the importance of a full examination of every commercial transaction before arriving at a decision that the Robinson-Patman Act has no effect.

Mr. Patman recently introduced two new bills to supplement the antitrust laws. One would make it an unfair method of competition for a manufacturer to sell any of his products at retail where the effect of such selling may be "substantially to lessen competition between such manufacturer or his customers, or tend to create a monopoly in such line of commerce, or to injure, destroy or prevent competition between a customer or customers of such manufacturer." The second bill would render it unlawful to make a sale or contract for sale of commodities, or a contract for furnishing any service, pursuant to any agreement that the seller will purchase from his customer or from any person designated by him any commodities or services, where the effect of the arrangement will be to lessen competition, tend to create a monopoly, or to injure competition between competitors.

While these acts may not be adopted at the present session, it would be idle to deny that they command impressive support, in a political sense at least. It is not known at the moment whether Mr. Patman will press for action on his bill to make illegal the use of the basing-point or delivered-price systems of sales. It may be expected, however, that agitation for this legislation will not cease, and while the industries concerned have a logical explanation for their use of one of or both these systems, the methods employed have been attacked by the Federal Trade Commission and any vigorous administration espousal of such a bill would render its passage more than an even bet.

Surtax on Undistributed Surplus.—There are many features of the Revenue Act of 1936 which contradict sound principles of taxation, but there is one phase of this law which may have the most damaging effect on such an industry as ours. Unless it is amended to permit corporations to retain a percentage of their earnings for legitimate capital improvements and expansions, the industrial building market seems almost certain to decline. Considerable sentiment exists within the Congress for amendment of the bill, but strong administration opposition may be voiced against such a course unless there is a popular demand for eliminating some of the drastic provisions of the measure.

The Seventy-Fifth Congress.—Since everything must await action on the judiciary proposal, it is difficult to give any intelligent forecast of legislative action during the current session until the position of the court has been clarified. Prominent among the measures now awaiting consideration is the O'Mahoney Federal Licensing Bill. So far the author of this measure has not secured administration support, but industry should be warned now that it involves more than voluntary federal incorporation. The bill would institute a system of requiring a federal license before one may engage in business, and conditions precedent to obtaining that license would demand a submission to minute federal control over every phase of industrial activity. Employers would be required to bargain collectively with representatives of their employees, and in the event of a strike or other labor dispute, wherein the Federal Trade Commission found that the employer was at fault, the license of such business could be revoked.

In collective bargaining the licensees would be required to be guided by the following principle: "Rates of pay of employees shall be increased, and hours of work shall be reduced in accordance with gains in the profits and in the productive efficiency of industry arising from increased mechanization, improvements in technological methods, or from other causes, to the end that employees shall have an equitable participation in the value of the output of industry, and that employment and mass-purchasing power may keep pace with the productive accomplishment of industry."

The commission would also be authorized to prohibit any practices it believed to be dishonest or fraudulent, even though by legal standards those practices might not constitute unfair methods of competition within the meaning of the antitrust laws. In addition to revocation of license to do business, maximum fines of $10,000 and imprisonment for five years could be applied to individuals, and corporations would be subject to a maximum fine in substantial amounts. The fate of this bill will be determined by subsequent events, and while it may never pass in its present form, it will be used as a stalking horse by those who are determined to bring all industrial activity under the control of the federal government. Another bill of this general character is the familiar 30-hr. workweek proposal. This will be used only as a threat and will not be adopted.

Industrial Control.—Many proposals are now before the President which have as their objective the restoration of some of the features of the National Recovery Act. In substance, these proposals calculate an amendment of the antitrust laws to permit industry to hold trade-practice conferences with a designated agency of the federal government, the rules under these conferences to be divided into two groups: the first group would be unfair trade practices consistent with the laws against monopoly and therefore binding upon all members of the industry, including minimum wages and maximum hours; the second group of rules would involve the prohibition of commercial practices which, while not necessarily violative of the antitrust laws, are still

considered to be destructive of industrial stability. The latter rules would be enforceable only against those members of the industry who contracted to respect them, but immunity from prosecution by the Department of Justice and the Federal Trade Commission would be afforded to the signatories, unless and until it was discovered that the practical operation of these rules resulted in an unreasonable restraint of trade.

This particular approach has already enlisted some measure of industry support, and it is not unlikely that a program along this line will actually be sponsored by the President. At the moment it is difficult to see wherein the federal government, in the light of unbroken judicial decisions, can control wages and hours in production or manufacturing, no matter what device is employed for that purpose. Furthermore, industry has a right to be skeptical about any proposal which offers reciprocal benefits for acceptance of federal domination over wages and hours. Our experience under the Recovery Act is sufficient to make us move with caution. The Supreme Court has always acted as a unit in sharply restricting the delegation of legislative power, and it is going to be a large task to select wording for any statute which will safely authorize a branch of the Executive Department to make industry law which is binding upon all members of that industry.

The Labor Situation.—Recent developments in labor relationships have been marked by the quiet burial of the National Labor Disputes Act. That act provided that employees should be entitled to organize and join labor organizations, to bargain collectively with representatives of their own choosing. Employers were enjoined from interfering with employees in the exercise of their rights, or to refuse to bargain collectively with authorized representatives of their employees. The legislation commanded the support of a solid labor front during its stormy passage through the Congress, but the majority-rule principle established by the act has been a boomerang to the craft unions which control the American Federation of Labor. That rule has played into the hands of John L. Lewis and it may spell out the reason for his recent successes in important industries. If the act is held to be constitutional, I would not be at all surprised to witness a move by the federation to repeal the law, for it is alleged that important leaders in that organization have already warned the National Labor Relations Board that its policies were antagonistic to craft-union interests.

It should be made plain that nothing under the act requires the employer to sign any written agreement with the employees or with representatives of his employees. He is required to bargain collectively with duly authorized agents of his employees, but there is no legal compulsion for acceptance of terms or for the reaching of any agreement, formal or informal. The problem concerned is not exclusively legalistic in character, but a clear understanding of the law is necessary if employers are to protect their legitimate rights.

I do not anticipate any serious enlargement of federal jurisdiction over labor disputes. Compulsory arbitration has been opposed in the past by labor organizations, but to the extent that federal power exists general legislation may be adopted patterned after the Railroad labor Mediation Board. This act seems to have worked in a highly successful manner; it restrains precipitate and impulsive action and insures an adequate statement of the public interest.

The Recovery Problem.—The difficulty inherent in any consideration of the problem of labor relationships is that those who champion laws to restrict the rights of industry appear to think exclusively in terms of money income. The recent wage increases in the steel industry were followed the next day by advances in the prices of steel. If wages advance more rapidly than prices, labor will achieve a net gain in its position; but if prices advance more rapidly than wages, general purchasing power will be reduced and the demand for steel and other commodities will decline, creating a new vicious spiral of unemployment. The Brookings Institute has recently reported the results of its study of the recovery problem in the United States. In the durable-goods industries it finds that it would be necessary to produce at the rate of approximately $33,000,000,000 annually from 1937 to 1941 to make up for present dificiencies. This may be compared with an actual production of about $21,000,000,000 in 1936, and an average production between 1925 and 1929 of about $25,000,000,000. Industrial activity on such a scale, stated the institute, would immediately absorb all the employables who do not now have jobs. If an orderly relationship can be maintained between wages and prices, if attention will be concentrated on increasing production rather than curtailing it by uneconomic wage costs, and if fiscal stability can be restored in the federal government, this country will undoubtedly enter a new era of prosperity without precedent in our history. . . .

The Job Ahead.—Industry has been forced by the turn of events to take an active interest in social and economic questions. If the American method of constantly-rising living standards is to prevail and if democratic government is to continue, industry must courageously assume the task of explaining its position to the federal and state governments which are now considering legislative devices to cure our unemployment problem. I know that this association will continue to carry out its share of that responsibility.

Washington *(from page 53)*

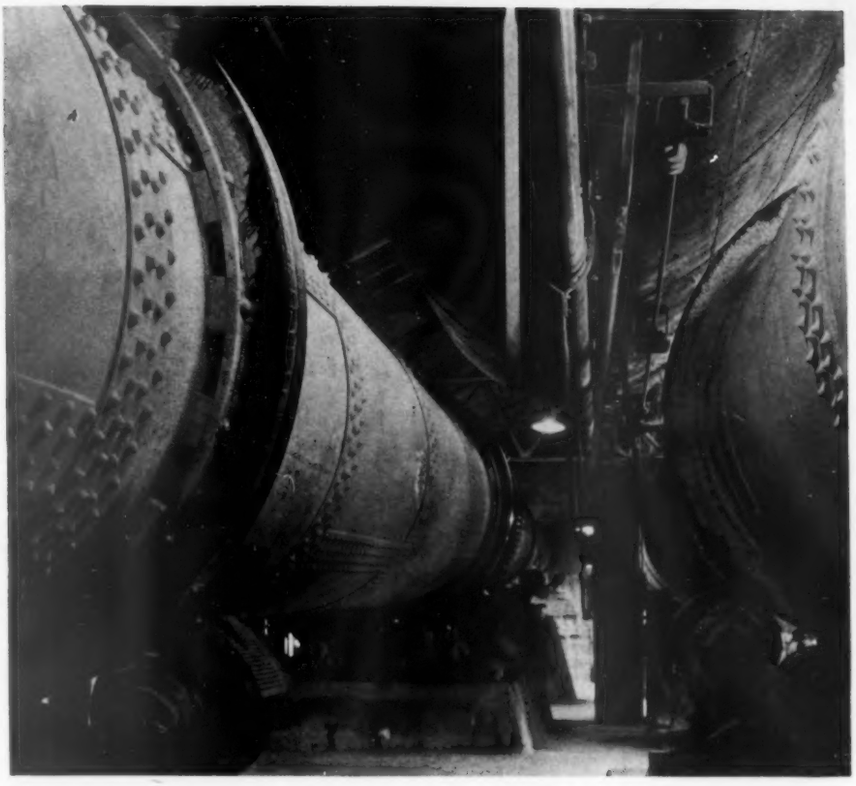
losses in working capital, and distribute earnings by dividends, not in the fiscal year in which the income is earned but during the next succeeding fiscal year. Chairman Robert L. Doughton, House Ways and Means Committee, is the leader in the fight to secure the modifications. Assuming that business throughout the country will impress upon congressional representatives its approval of the effort to modify the surtax on excess profits, it is probable that successful action may be accomplished when the tension of the moment eases.

The House Labor Committee has scheduled a series of hearings on the Ellenbogen bill which sets up a National Textile Commission to supervise labor conditions and trade practices in that industry. It is proposed that the Ellenbogen bill shall form the model to regulate other key industries.

Donald Richberg's efforts to secure a "restatement" of anti-trust laws and other laws regulating industry have culminated in the recommendation addressed by Attorney-General Cummings to the President suggesting the appointment of a commission to investigate laws, patents, taxation, manufacturing, farming and labor, and to suggest methods of more powerful enforcement, either by legislatively making the Federal Trade Commission more effective and adequate, or by providing other means of enforcement. This action was forecast in PIT AND QUARRY in January.

The Social Security tax suits will undoubtedly be decided by the Supreme Court late in May. The Boston case and the Alabama suit are to be ruled upon simultaneously. The ruling will determine the constitutionality of all or various parts of the act, and will make considerable difference to the Treasury as well as to industry and its employees. It was estimated that Social Security tax collections were approximately $300,000,000 short on March 15. Twenty-six suits are pending in nine federal district courts located in the populous industrial centers of New York, Massachusetts, Pennsylvania, North Carolina, South Carolina, Virginia, Alabama, Mississippi and Kentucky.

D. C. Jeffrey, superintendent of the Akron, N. Y. plant.



The two 7-ft. by 110-ft. rotary calciners with feed bins above.

National Gypsum Co. Modernizes Its Operations at Akron, N. Y.

WHEN the National Gypsum Co. acquired the property of the Universal Gypsum & Lime Co. in the fall of 1935 plans were immediately laid to bring the acquired gypsum and lime plants up to National's standard of operation. Under this program the five operating plants acquired have been improved at a total cost of over $250,000. The lime plants at York, Pa., and Oranda, Va., and the gypsum plants at Akron, N. Y., Rotan, Tex., and Fort Dodge, Ia., were affected. Each of the company's five gypsum plants can now produce board and plaster of improved quality at lower costs. Each of these plants is also equipped to ship the new processed plaster and light-weight board along with the company's complete line of other gypsum products.

One of the first plants affected by this program was the gypsum plant at Akron, N. Y., in the largest gypsum-producing section in this country. Operations were first begun at this location about 1907 and the present shaft and plaster plant went into operation in 1923. The Universal Gypsum & Lime Co. took over this property in 1924. A board plant was added in 1925 and the kettle mill in 1927. Improvements made to this plant since its acquisition by the National Gypsum Co. included the installation of additional crushing, screening and grinding equipment, new raw-gypsum and plaster storage facilities, an improved board machine and drier with the latest features for automatic operation, and the enlargement of the board storage warehouse.

Unlike the methods followed in most other gypsum plants, the crushing of the raw rock is done at the mine level so that the comparatively economical bucket-elevator can be used to raise the raw gypsum to the surface instead of the hoist and skip bucket common in this district. In order to avoid excessive "peak" power loads the mining and loading of the rock is done in the daytime. The crushing and calcining are done at night. There are enough cars in the mine to take care of a day's operation at the present plant capacity and the rock storage capacity is sufficient to keep the calciners busy for 24-hr. operation daily.

The rock mined one day is shipped the next day as finished product. The daily plant capacity is now 1,000 tons of raw rock, 600 tons of plaster, and 200,000 sq. ft. of board or lath. When the calcining kettles are operated, an additional 300 tons of plaster can be produced daily.

The gypsum vein from which this plant is supplied lies 65 ft. underground, and is from 3 to 5 ft. in depth and 1,000 to 4,000 ft. in width. It is being worked by the room-and-pillar system with 25-ft. rooms and 10-ft. pillars. Blast holes are bored with Scranton electric drills, each drill having its individual crew. Each crew works in 6 rooms until they are worked out and then moves on. Usually three rooms are drilled and shot in one day while rock is loaded in three other rooms. In each crew one miner and an assistant operate the drill and do the blasting, 5 to 6 men do the loading and one man takes care of the timbers, track, etc. Each machine and crew averages about 125 tons per 8-hr. day.

In each room about 14 holes are drilled in two rows for each shot. In a 5-ft. vein the top row of holes is about 1 ft. from the top of the room. These holes slope upward and are about 10 ft. deep. The bottom holes are about 1 ft. from the floor and slope downward. The holes in the top row are staggered over about 6 in. from those in the bottom row to get better breakage. Each top hole is loaded with from five to six 1¼-in. by 8-in. sticks of dynamite and each bottom hole with 10 to 12 sticks. General 20-per cent. Grade A2 dynamite and Clover Leaf fuse and caps are used.

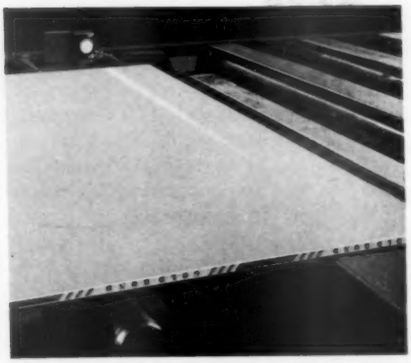
The deposit has an east-and-west strike with a slope of 1 per cent. to the south. This slope drains the entire mine to a sump about 2 mi. south of the present workings.

The broken rock is loaded by hand into 1½-ton mine cars which are equipped with Timken bearings. The loaded cars are pushed from the rooms

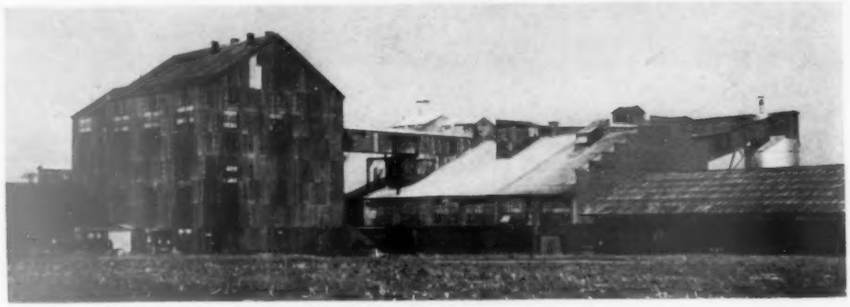
Above: Part of the board machine viewed from the feed end.

Above: Finished board being discharged from the drier and loaded on skids.

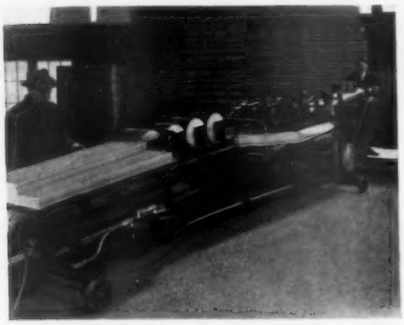
Right: Photo-electric cell operating a mechanical board cutter.



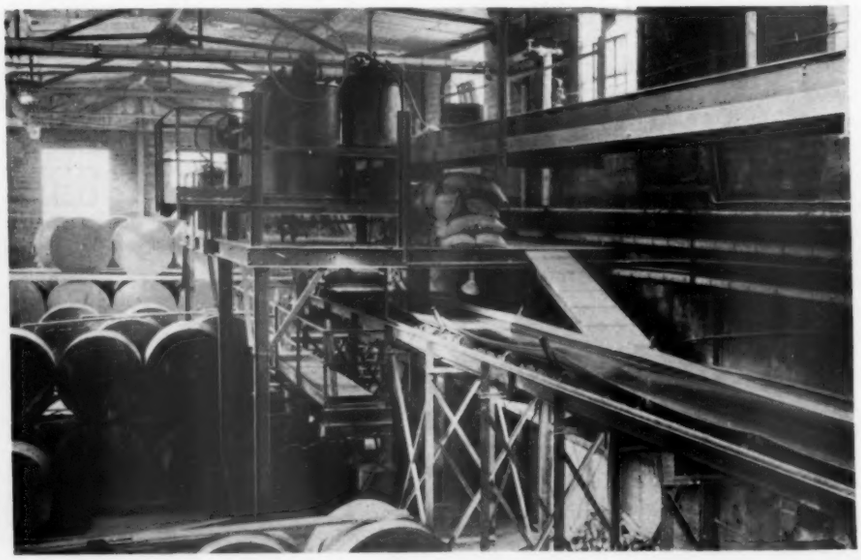
Below: Device which packages gypsum lath at wall-board machine capacity.



Above: The Akron, N. Y., plant of the National Gypsum Co.



Below: The feed end of the board machine showing mix being discharged on paper.



Below: One of the ten tests to which every roll of paper is subjected.

to the passages, where they are made up into trains of about 35 cars each. The main haulage gangway to the shaft runs east and west and auxiliary gangways are at 45-deg. angles northeast and southeast. As the rooms are worked up-grade at right angles from the auxiliary gangways the loaded cars are pushed down a ½-per cent. grade.

Two 5-ton Goodman electric trolley locomotives haul the cars to a rotary dumper at the mine shaft. This dumper operates entirely by gravity and the only control is a lever-operated band brake which holds the dumper stationary while a car is being moved on or off it. The car rests on the dumper 6 in. off center, and when the brake is released the dumper tips automatically, discharging the contents of the car. The momentum of the backswing then rights the dumper.

The rock is discharged from the track hopper on an inclined pan conveyor which feeds a Jeffrey 42-in. by

Raw gypsum being discharged from car in mine by rotary car dumper.

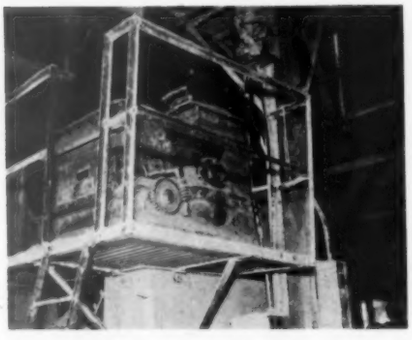
48-in. rigid-type hammer-mill. The 1½-in. minus product is discharged on a short belt-conveyor feeding a chain-bucket elevator which takes it 85 ft. to the ground-level. A second bucket-elevator feeds the rock to a double-deck vibrating screen. Material retained on this screen is further reduced in a Pennsylvania TR2 Trojan ringmill crusher. The material passing through the screen together with the crusher product is usually discharged by gravity

One of the 5-ton electric trolley locomotives in the mine with train of loaded cars at right.

One of the automatic weighing hoppers controlling plastic ingredients.

into the calciner-feed bins. If desired, however, it can be discharged on a belt-conveyor for stock-pile storage or any desired size can be discharged on another belt-conveyor for loading into cars for shipment. Most of the raw rock sold goes into the manufacture of Portland cement.

The bins feed two 7-ft. by 110-ft. rotary calciners, which have Tyler recording thermometers registering cal-



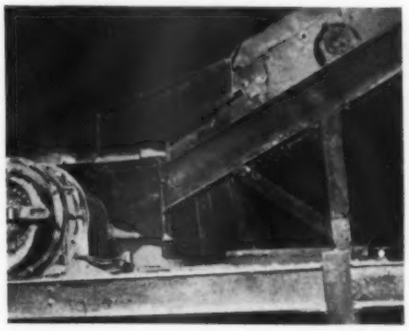
The swing-hammer mill used for preliminary grinding of calcined gypsum.

cining-zone temperatures and Bristol pyrometers indicating stack temperatures. These instruments, together with the draft control, enable the calciner operator to keep the calcining temperature close to 400 deg. F. with low fuel consumption. The coal used for fuel is ground in a Kennedy-Van Saun air-swept tube-mill connected to a cyclone. The pulverized coal is discharged from the cyclone on a screw-conveyor which supplies the burner-feed bins. When desired the pulverized coal can be discharged into a blowing tank from which it is blown about 700 ft. to the boiler-house.

When the calcining kettles are operated, the gypsum is fed from the rotary calciner feed bins to two Raymond 5-roll mills. Calcining is done in two 10-ton standard kettles from which the product is discharged by gravity to a hot pit and thence is carried by a drag-chain to conveyors running to the board plant. These kettles are coal-fired.

The calcined gypsum from the rotary calciners is carried by a screw-conveyor and an elevator to a Pennsylvania swing-hammer mill. The minus ¼-in. product is taken by another elevator and a screw-conveyor to either of two Kennedy-Van Saun air-swept tube-mills. The 8-ft. by 22-ft. mill is used when grinding for plaster and the 8-ft. by 12-ft. mill for specialties. Steel grinding balls are used in both mills.

The product of either mill is discharged into a screw-conveyor which feeds a bucket-elevator from which the material is discharged into any of five



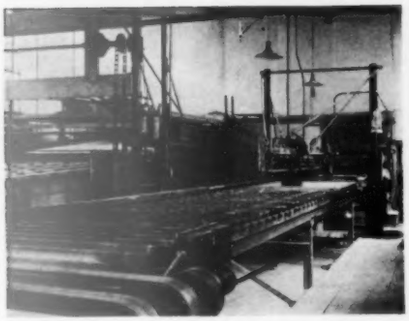
The double-deck vibrating screen from which oversize goes into crusher at left.

200-ton steel stucco storage bins. The plaster mill is supplied from three of these bins and the board plant from the other two bins. Drag chains inside the bottoms of these bins feed a screw-conveyor. This screw can discharge the material to an elevator and screw-conveyor feeding the bins over four Broughton mixers. Hair or other ingredients are added in these mixers to convert the stucco into plaster. Three Bates baggers under the mixers pack

Manganese-steel balls in one of the gypsum-grinding mills.

the finished plaster in paper bags for shipment.

The same screw-conveyor under the stucco storage bins feeds the board material into a steel storage tank at the board plant. Another drag feeder conveyor and a screw-conveyor and ele-



Conveyor from board machine discharges on transfer conveyor in foreground to drier conveyor at left.

vator in series feed into a small stucco bin over the soak belt on the board machine. The board-plant storage tank has an automatic control system with a Reeves variable-speed drive which keeps the bin content between two levels. This control is connected to the equipment feeding to and from the tank. The board machine is of standard design but has a longer soak belt than is customary in order to insure a thorough mixing of the core material. Paper is ground up in a beater mill and is stored in chests under the floor from which it is fed to the soak belt.

The proper amounts of stucco, water, paper and other ingredients for lightweight board are fed on this belt and mixed by agitators and a ball mixer. The mixture is distributed in the desired amount on one layer of paper from a gate in the bottom of the mixer. This paper with the mix is then drawn through two master rolls set for the desired board thickness. The ⅜-in. board is most popular but ¼-in. and ½-in. boards are also made. At this point the paper is also scored to make a square edge on each side, paste is applied and the top layer of paper rolled down on the board to seal the lap. The formed board is then carried on a belt-conveyor and rollers for a distance of 530 ft. at the rate of 30 to 60-ft. per min. This gives the board time to set before it reaches the Knowlton cut-off knife, which can be set to cut any length of board between the limits of 3 and 12 ft. The board sections are then carried on gravity rollers to a Coe Mfg. Co. automatic cross belt transfer. A photoelectric cell starts the transfer only after the board has passed it and the transfer is completed before the next board section arrives at the transfer and stops it. The board sections are transferred on a roller-tape conveyor which automatically feeds the succeeding board sections in turn to the six decks of the kiln. The kiln is made by the Coe Mfg. Co. and is 250 ft. long including the take-off. Steam drier coils in the kiln maintain a temperature of 300 deg. F. in the kiln to which the boards are exposed for about 90 min.

One of the three packers used for loading plaster into paper bags.

The dried boards are transferred by hand from the six-level kiln take-off to wooden skids. When loaded, these skids are picked up by an Elwell-Parker gasoline lift truck and taken to the warehouse or into box-cars for shipment. The warehouse has storage space for 1,500,000 sq. ft. of board. The Gerard wire-tie system of unit loading into cars is used. This system ties two piles of board together and utilizes the weight of the piles to prevent shifting.

The products of this plant include a complete line of gypsum board, lath, and sheathing. All kinds of prepared and hardwall plasters, cement plasters and gaging plasters are also made. A complete line of metal lath, finishing lime, white plaster, etc., made at other company-owned plants, are also carried so that complete mixed carloads can be shipped direct.

A corner of the routine quality control laboratory with some of the apparatus.

Chemical Lime (*from page 63*)

on one track can be loaded while another car is being "spotted" on the other track for loading. Truck shipments can also be made.

The control systems in this plant are usually complete and effective. The first control is at the kiln-feed bin where high and low Bindicators insure a constant supply of stone to the kiln. A similar system is used in the coal-mill feed bin to insure a constant supply of fuel to the kiln. The pan feeder supplying stone to the kiln is started automatically once for each revolution of the kiln by means of a photoëlectric cell and stopped by a timed control under a predetermined setting. A pointer gage on the stone feeder is set for the required depth of material and any change in this bed is indicated in the kiln-control room. A revolution counter is to be installed on the feeder motor.

A photoëlectric cell aimed in a hole in the kiln hood is focused on the glowing bed of material and "reads" the temperature from the color of the material. A control system records the temperature in the kiln and automatically maintains perfect kiln conditions within a 10-deg. F. variation. When any radical change takes place in the various conditions affecting the kiln's performance this is automatically compensated for. Overburning or underburning of the lime is impossible with these controls, as the amount of coal fed to the kiln is automatically increased and the speed of the kiln is reduced if the temperature falls too low and vice versa. Positive induced draft control is also an important factor in the control of burning. Photoëlectric cells will also control the flow of stone on the mine belt-conveyor and will be applied to other operations.

Controls mounted on a board in the kiln-firing room regulate the operation of the equipment connected with the kiln as well as the lime-handling, screening and grinding equipment and the coal handling, grinding and feed. On this board also are draft gages, switches, speed indicators, volt meters and ammeters, and a 10-point selective Leeds-Northrup pyrometer which gives instantaneous reading of air temperatures in the kiln, cooler, coal mill, etc. A Bailey multi-pointer gage records the draft in the kiln, in the cooler and pressures in the primary and secondary air-lines.

Direct current for the variable-speed motors operating the kiln and its appurtenant equipment is supplied by a 250-hp. Elliot motor-generator set in the kiln-control room where the coal mill is also located.

The plant is constructed of steel and concrete throughout and all the buildings and equipment are on reinforced-concrete foundations resting on bed rock. The framework of the buildings is electrically-welded structural steel. The erection and much of the fabrication of this steel were performed by the company's forces. Corrugated-metal siding and roofing is used on all the plant buildings other than brick

(*Continued on page 78*)

Digest of Pertinent Papers Read at World Congress of I. A. T. M.

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Included among the papers of "Group B, Inorganic Materials" presented at the international congress of the International Assn. for Testing Materials in London, April 19 to 24, 1937, were a number concerning the properties and methods of testing of nonmetallic minerals, under the general heading "Concrete and Reinforced Concrete." Papers of specific interest to PIT AND QUARRY readers are briefly summarized in the accompanying text.

★ ★

● Aluminous Cement

Concerning Some Properties of Fused Cement, by Etienne Rengade, France.—The properties considered are the effect of lowered temperature on the initial hardening of fused cement, and the resistance of fused cement to the action of pure waters. As to the first, the author reports comparative studies of the effect of temperatures between 18 and 0 deg. C. on the initial hardening of normal and super-Portland and aluminous cements, the results showing: (1) that in each case an increase in the cement-water ratio increases the strengths in the early periods, and (2) that the high early strength of alumina cement gives this cement a decided advantage over the other types at the lower temperatures. As to the resistance to the action of pure waters, the author makes a preliminary report on an investigation which is now under way and in which concrete specimens prepared from various cements are exposed to a flow of very pure natural water; photographs of the specimens after exposure for 200 days show a much better preservation in case of the alumina-cement concrete than in those of concretes made with cements of other types.

Strength Tests for High Alumina Cement, by W. H. Glanville, Road Research Laboratory, Harmondsworth, Middlesex, England.—This paper is based on work which has been under way for the past five or six years by a committee of the British Standards Institution which has under consideration the issue of a standard specification for high-alumina cement, it being felt that it is desirable to include a strength test which would form a better guide than the usual tensile-strength tests to the behavior of the cement in concrete. The use of vibrators, both a low-frequency and a high-frequency machine, is being developed for the purpose of producing better specimens for testing; with the high-frequency machine it has been possible to reduce the water content, and results to the date of writing show that the personal variations in the methods of mixing, mold-filling and compacting have been almost completely eliminated.

● Testing of Plastic Mortars

On the Question of Standard Testing by Means of Plastic Mortar, by Prof. A. Gessner and A. Frank, Technical College, Prague, Czechoslovakia.—Fifteen ordinary and twenty super-Portland cements were tested according to three methods: (a) the standard Czechoslovakian tests, corresponding to the German, on mortar of "moist earth" consistency, (b) in prisms of plastic mortar according to the Swiss standard specifications of 1932, but using German standard sand and a variable quantity of water, and (c) in standard tests (tensile-test specimens in 8-shape and cubes) of the same proportions of water as in (b). The results appear to indicate that tests in plastic mortar may be made on the standard specimens "c" as well as in the prisms of method, "b". The actual strength results are less in method "c" than in (a) because of the higher proportion of water. It is noteworthy that in classifying the varieties of cement tested, assigning them to groups according to quality, the classification according to the three different methods corresponded with very few exceptions.

Concerning the Testing of Cement with the Use of Plastic Mortar, by Dr. G. Haegermann, Berlin-Karlshorst, Germany.—A testing method employing plastic mortar (which is described) has been prescribed since 1934 for cements used in concrete-road construction in Germany. According to the researches of Werner-Hedström and von Schwiete, the new process provides a better comparison with the concrete strengths, and inquiry of cement plants during the past two years since it has been introduced shows that it is preferred over the old method.

Laboratory Tests on Plastic Mortars in Relation to Other Tests Suggested for the Acceptance of Cements, by Dr. A. Perfetti, Royal Experimental Institute of Communications, Rome, Italy.—This report is based on tests made on thirteen Italian cements of aluminous, Portland, pozzuolanic and blast-furnace types, and employing various standard specifications and sands. The study indicates that in acceptance tests for cements beaten (tamped) mortars do not offer any advantage over plastic mortars; that the relative order (evaluation) of the types of cement in the testing of plastic mortars with Italian test pieces is almost the same as that obtained when testing beaten mortars, although the relative order differs in the case of plastic tests with different test pieces; the results obtained from the tests on concretes lead to a relative order differing from that obtained with plastic mortars; and that the maximum and minimum differences between extreme values and average values are much smaller for concretes than for mortars. More uniform results are obtained in tests of concrete than by other methods of testing; the next best method is believed to be the test with plastic mortar made with monogranular sand with crushing-test pieces according to the French method and test pieces for bending tests according to the Swiss method.

Quicker Testing of Cement and Concrete by Means of Electric Heating, by Albert Brund, Härnösand, Sweden.—Alternating current generates heat in fresh cement or concrete mixtures and thereby greatly accelerates the hardening. The variation of strength figures obtained in this way is very limited, because the rate of heat development and the distribution of heat and moisture in the mixture are regulated by automatic variations in electrical resistance during the hardening process, so that the specimen attains uniform hardness. On the basis of the preliminary observations it is obvious that this method offers important practical advantages, and a series of tests on a larger scale is to be made with a view to developing the method further.

● Development of Heat by Cement

Comparison of Methods for Measuring the Heat of Hydration of Cements, by F. M. Lea, Building Research Station, Garston, Herts, England.—Methods which have been developed for measuring the heat of hydration may broadly be grouped in three classes: (1) the heat-of-solution method, (2) adiabatic calorimetric methods, and (3) semi- and non-adiabatic calorimetric methods. The adiabatic method seems preferable in principle, it enables the complete heat-evolution curve to be determined over the period of the test, but is not very suitable for test periods of 28 days and over; for such periods the heat-of-solution method is more suitable. The adiabatic method has been tentatively recommended by the International Sub-committee on Special Cements for Large Dams.

Methods of Testing Cements for Large Dams, by B. Hellström, chairman of the International Sub-committee on Special Cements for Large Dams.—The work of this sub-committee is more fully set out in its Interim Report to the Washington congress of September, 1936. The adiabatic method has been recommended for determining heat of hydration (see foregoing paper); after consideration of various tests of the action of water percolating through cement the committee believes the Swedish extraction method to be a suitable routine method; investigations on shrinkage are still to be carried out, but the German method of testing shrinkage is believed worth consideration; a detailed method of testing permeability has not been standardized, but the committee has made some recommendations applicable to any test method that may be preferred; as to workability, no satisfactory or recognized test method has yet been evolved.

Controlling the Heat of Hydration of Cements, by P. H. Bates, Clay and Silicate Products Division, National Bureau of Standards, Washington.—Up to now three methods for the production of cements with low heats of hydration have been suggested. According to the method most often employed the usual composition is changed by the reduction of the alumina and lime content, accompanied with a large increase in the amount of iron oxide and a lesser increase in the silica; or by a large increase in silica and a reduction in the amount of the other three major oxides. The second method is based upon "heat-treating" the clinker. The third is based upon a partial hydration of normal cements. Data which question the correctness of the assumption upon which the first method is based have accumulated. Data on the second are not as yet very complete, but indicate that "heat treatment" following clinkering may reduce the heat of hydration by 25 per cent. The third method is described and its results indicated in Bureau of Standards Research Paper 887 (1936, vol. 16, pp. 487-509).

● Sea-Water Cements

Some Remarks Relative to the Destruction of Concretes, by Prof. G. Batta, Laboratory of Industrial Chemistry, University of Liége, Belgium.—The investigations studied in this report treat of the destruction of concretes by solution of the reactive components, and destruction by expansive actions. In view of the lack of chemical stability of concrete the obtaining of a concrete of the greatest possible impermeability to aggressive waters is of prime importance, and further investigations have this end in view.

Mechanical Strengths of Mortars Stored in Sulphate Solutions, by G. Baire, honorary director of the laboratory of the Societe des Ciments Francais, Boulogne-sur-Mer, France.—The investigations on which this paper is based tested the action of magnesium-sulphate, calcium-sulphate and sodium-sulphate solutions on mortars made with a number of types of cements. The results showed in general reductions in strength due to immersion in the solutions concerned, but the curves for periods of one to two years would not indicate an ultimate decomposition. The most harmful solution was the magnesium sulphate. In the case of Portland cements the damage increased with increased lime content. The gaize cements were little affected, and the blast-furnace type cements still less.

Sea-Water Cements, by Prof. Dr. Hans Kühl, Cement and Mortar Laboratory, Berlin-Lichterfelde, Germany.—This paper is a summary of the methods employed for increasing the density of concrete; of the chemical reactions underlying the destruction of concretes by chemical attack, and the resistance of various types of cement to such attack; and of the research and test methods involved. The whole is documented with exhaustive citations of the literature of the subject.

The Testing of Pozzuolanic Cements, by F. M. Lea, Building Research Station, Garston, Herts, England.—The testing of blended cements containing a mixture of pozzuolana with Portland cement raises special problems because of the differing rates of hydration and strength development. The testing may be on the blended cement, as in certain national specifications, or separately for the two materials; in the latter case the pozzuolana is tested in a lime mortar. Although lime-mortar tests are of value when considering lime-pozzuolana mixes, they do not afford a satisfactory indication of the value of a pozzuolana for use in mixtures with Portland cement.

The substitution of pozzuolana for Portland cement reduces the strength of the concrete at early ages, but no corresponding reduction is found in the strength of mortars of dry consistency; mortars of plastic consistency, however, offer a much improved indication of the strength of concrete at similar ages. The strength tests at short ages do not differentiate between pozzuolanic cements containing good and poor pozzuolanas. Investigations now in progress favor a test of two sets of plastic-mortar briquettes under different conditions of storage; the ratio of the differences between the strengths obtained has been found to show a fair correlation with the resistance to attack by magnesium- and sodium-sulphate solutions and to strength at long ages. Another test which has been found to be of some value is a form of lime-extraction test on the set neat cement.

Ferrous and Ferrous-Pozzuolanic Cements in Contact With Aggressive Waters, by Prof. F. Ferrari, Livorno-Ardenza, Italy.—After a general discussion of the nature of the corrosive action of sea water, certain lake waters, etc., containing sulphates, chlorides, etc., and CO_2, the author reports tests on the resistance to such attack of a ferrous cement and of a mixed cement of such ferrous cement and a high-grade pozzuolana, the results in each case showing a high resistance to such attack. In actual practice the conditions should be even less severe than those of the test.

Contribution to the Understanding of the Action of Sea Water on Concrete, by Dr. A. Steopoe, Rumania.—The author presents his conclusions from the last two years of investigations aimed at the explanation of the destructive action of sea water on concrete, not only where the action is an expanding and cracking effect but also where actual corrosion is concerned. These conclusions add to the understanding of the actions of some of the minerals concerned, and provide experimental verification of theoretical studies of other investigators.

Remarks On the Behavior of Santorin Concrete on Long Storage in Sea Water, by Dr. A. Steopoe, Rumania.—(A paper of interest in connection with the foregoing, reporting on examinations of concrete works in the Black Sea made of crushed limestone, lime and Santorin earth.)

● Waterproofing Compounds

Concerning Means for Waterproofing Mortar and Concrete, by M. Spindel, Vienna, Austria.—"Quick-setting densifying admixtures" are indispensable for many cases in building practice, but they must be appropriate for the cement and for the requirements of the job. Careful and appropriate testing is essential even in the most favorable cases, and there are even admixtures for the purpose of increasing density which have a harmful action. The admixtures themselves and the test methods therefor are still to be perfected.

The Testing of Waterproofing Materials for Concrete, by J. Loventhal, director of the National Testing Institute, Copenhagen, Denmark. — This paper is a brief description of tests on commercial waterproofing materials for concrete, carried out at the Danish National Institute for Testing Materials. The tests showed very great differences in the value of the various materials, and that the relation of one to another is not the same for all pressures of water. The liquids and the pastes seemed, as a rule, to be more effective than the powders. Comparative tests on increased cement admixture showed this to be preferable, as it increases the strength as well as the impermeability in cases where the shrinkage caused by the richer mortar does not prevent the use of this method.

● Vibrated Concrete

Thickening Mortar and Concrete by Vibration, by Prof. Otto Graf, Stuttgart, Germany.—The thickening of concrete by vibration is appropriate for concrete which otherwise is tamped in working. By vibration of such concrete a determined strength can be achieved with the use of less cement because the vibrated concrete can be mixed a little stiffer and because the vibrated concrete has a greater weight per volume. The union at the surfaces of courses is also better than with tamping. More fluid mixes can also be made heavier by vibrating, but the strength is decreased on account of segregation. Further studies are under way on the questions of vibrating apparatus and the control of the process.

Compaction of Mortar Cubes by Vibration, by A. J. Newport, Building Research Station, Garston, Herts, England.—The machine for compacting mortar cubes by vibration which is described in this paper was developed for the purpose of reducing the variation in strengths produced by different operators, and of enabling cubes of lower water content to be tested. A representative series of tests shows that the greatest variation from the mean for vibrated cubes, using 10 per cent. of water, is about 3 per cent., which represents a very great advance on all previous results and shows that for all practical purposes the personal factor may be regarded as eliminated.

High-Frequency Vibration of Concrete, by F. H. Jackson, U. S. Bureau of Public Roads, Washington.—The successful application of the principle of high-frequency vibration to the placing of concrete ranks as an outstanding development in the art. Its importance lies in the fact that it is possible by means of vibration to extend the application of the water-cement ratio strength relation to dry mixtures entirely outside the usual workability range and thus attain in practice the high strength and density which should accompany the use of a low water content. Some of the experimental work and practical applications are discussed in this paper.

● Concrete Pipes

Concrete Pipes, by Prof. R. Grün, Düsseldorf, Germany.—Well-laid concrete pipes are not damaged by mechanical stress; their only foe is chemical destruction of the cement binder, either from moisture in the earth without or from the water inside. Well-produced concrete pipes can have high resistance even to severe chemical attack. This paper discusses the difficulties to be overcome, the problems involved in the preparation and protection of the concrete, and the commoner sources of faults.

Spun Cement Pipes, Reinforced and Not Reinforced, by Prof. M. Ros, director of the Federal Material Testing and Research Bureau, Zurich, Switzerland.—The production of spun cement pipes, with or without reinforcing, consists in the horizontal or vertical centrifugal filling of a form with concrete of a dry to a stiff plastic mortar. The testing of such pipes presents special problems, which are discussed in this paper.

● Other Topics

Investigations Regarding Aggregates for Concrete, by Erik V. Meyer, Technical Information Office of Danish Cement Works, Copenhagen, Denmark.—This paper deals with: (a) a method for the combination of a number of aggregates with different sieve curves in such a way that the sieve curve for the combined materials coincides as nearly as possible with the ideal curve, and (b) a method to determine the water content of sand. As to "a", a graphic method is set out for computing the combination of a number of aggregates to yield the desired sieve curve, or for judging how far two aggregates are from being able to be combined in an aggregate corresponding to the ideal curve. As to "b", a "handy apparatus" for determining the water content of sand is discussed but not described; it is based upon ascertainment of the water content by determining the reduced weight of the sand by immersion in water, the specific gravity of the sand particles being determined once and for all for a given sand.

Porosity and Permeability of Concretes, by R. Feret, chief of the Laboratoire des Ponts et Chaussees of Boulogne-sur-Mer, France.—It is important to distinguish between the porosity of mortar and concrete, defined by the total volume of voids between the solid particles, and the permeability, which depends on the dimensions and the inter-communication of the largest cavities. Among mortars simply immersed in sea water, it was those without fine sand, in which the cavities were largest, which were decomposed; on the other hand, when the sea water was agitated by filtration the mortars with fine sand, which let only a very little water pass but which were porous, were most damaged. It is believed that concretes suffer more on account of porosity than on account of permeability. In experiments with varying proportions of coarse and of fine sand, with a flour finer than cement, and with four different cements, it was found that in the case of each of the cements the minimum of porosity and the maximum of resistance to attack were obtained at 78 per cent. of coarse sand, no fine sand, and 22 per cent. of flour and cement together. The choice of the inert admixture and its proportion should be selected so as to reduce the quantity of water to the minimum compatible with workability.

Relation Between Tensile and Compressive Strengths of Mortars and Concretes, by R. Feret, chief of the Laboratoire des Ponts et Chaussees of Boulogne-sur-Mer, France.—Studies on the relation between tensile and compressive strengths indicate a great variability, the tensile-strength results being more influenced by the conditions of the test than the compressive-strength. The great diversity in the results is ascribed to the inevitable heterogeneity of the specimens concerned.

Researches Concerning the Influence of Mechanical Factors in the Set of Cements and the Agglomeration of Mineral Powders, by R. L'Hermite, Laboratory of Construction and Public Works, Paris, France.—The labors of Le Chatelier, completed and developed by Freyssinet, show that certain solid bodies owe their cohesion at least at the

(Continued on page 78)

By W. E. TRAUFFER

One of the rebuilt dredges, at left, and below a general panorama of the processing plant of the Saxet Sand & Gravel Co., near Victoria, Tex.

Texas Gravel Plant Rebuilt After Cost Records Fail to Show Profit

MANY aggregate producers who believe their plants to be efficient and economical in operation would, if accurate cost records were kept, find that seemingly unimportant methods and practices were absorbing all or most of their profits. An excellent example is the plant of the Saxet Sand & Gravel Co. near Victoria, Tex. When last described (*P&Q,* Aug. 24, 1932, pp. 18-20) this plant was to all appearances a fairly well-managed operation which should have been showing a good profit. Actually it was losing money in spite of a capacity demand and predepression prices.

This plant was put into operation in November, 1928 by the Saxet Co., a firm interested in many utilities and manufacturing industries. Later the plant was taken over by the Republic Gas Co., which operated it as the Saxet Sand & Gravel Co. During the depression the plant went into receivership and on Jan. 1, 1935 was taken over by the Republic Natural Gas Co. This company has over 800 producing oil and gas wells and the gravel business is only a sideline of minor importance. Good business judgment was shown, however, in selecting men of wide practical experience in sand-and-gravel production to operate and manage the plant. Alfred Hurlburt is now vice-president and general manager of the company and John A. Buechler is superintendent and engineer. Mr. Buechler has been actively engaged in sand-and-gravel production for many years and from 1925 until 1933 was in charge of the operations of the Ward Sand & Gravel Co. at Oxford, Mich., where sand-and-gravel production history was made.

From the day the plant was first operated by the original owners a loss was shown each year in spite of the fact that prices were good and that 24-hr. operation was necessary to meet the demand up to the early part of 1931. Even in 1930, when the record total of nearly 400,000 tons was shipped, no profit was shown. In 1932 and 1933 the demand fell off sharply, but in 1935 production was again close to capacity. Under the new management 350,000 tons was marketed in 1935 and all the debts were paid. In 1936 the same amount was shipped and a substantial profit was shown. This has been accomplished in spite of prices considerably below those prevailing before the depression. The direct production cost per ton has averaged less than one-half of the cost of former years.

Some of the improvement in the company's financial status has undoubtedly been due to the more efficient management of sales and the other non-operating branches of the business. But it is in the operation of the plant that the most tangible results were obtained and in which the majority of producers will be most interested. Because of the many and varied improvements made no attempt will be made to describe them in the order of their importance or location in the plant flowsheet. Operations which have not been changed will not be described in detail as this was done in the previous article.

This plant is located in the flood basin of the Guadalupe River about 2½ mi. west of Victoria. When this river overflowed its banks on July 3, 1936, the entire plant was under water for three weeks. In some parts of the plant the water was 10 ft. deep and the office-building floor was under 3 ft. of water. One of the accompanying pictures, taken at the crest of the flood, illustrates the conditions existing at that time.

The first step in improving the operations was the removal of the dredge cutting ladder which is not needed in this well-graded and loose deposit. The sand-drags were then removed from the plant. Next dredge No. 1 was rebuilt, and dredge No. 2, built in 1931, was retired from service as a "booster" on the dredge-line. A new pipe-line and pontoons were next added. Two of the six revolving sizing screens were then replaced by two fine-sizing vibrating screens. A "doodle-bug" system for disposing of the overburden replaced the truck-haulage system in use; a conveyor was installed to reclaim small material and add it to the railway ballast; and a truck-loading bin and conveyors were added. At the time of the writer's visit to the plant late in November, 1936, a concrete inclosure for the scalping screen was under construction. According to Mr. Buehler, the next step will be the rebuilding of the No. 2 dredge as an auxiliary to be used in case the other dredge is shut down. The plant can now produce 75 cars of material daily.

At the present rate of production the acreage now being dredged will be exhausted within the next two or three years. It will then be necessary to cross a main highway and railroad line to work the bulk of the property owned by the company. The company plans to move the dredge across these obstacles and start a new pond on the other side. The dredge pipe-line will be run under a highway trestle and railroad bridges which happen to be suitably located.

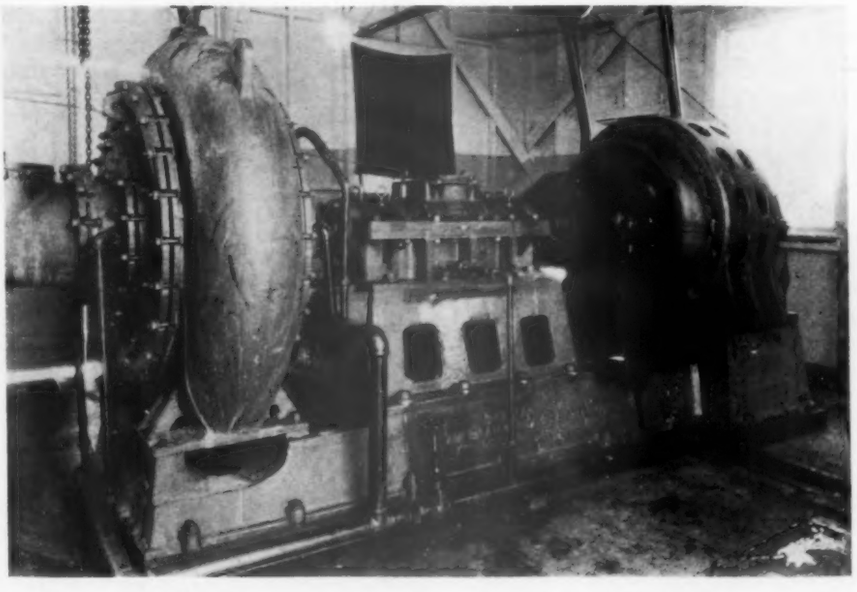
General view from the screening building showing dredge and pipe-line in distance and crusher building at left.

One of the first important improvements made by the new management was the rebuilding in September, 1935, of dredge No. 1 which was originally built in 1929. An Amsco 12-in. "Counterflow" pump was installed and a new 12-in. pipe-line to the plant was purchased. The deposit is being excavated to a depth of from 30 to 60 ft. and the material averages about 40 per cent. under ¼ in. in size. With a 1,740-ft. dredge-line and a vertical head of 22 ft. the pump is handling from 125 to 175 tons per hr. to the plant, depending on the condition of the deposit. The pump is driven by a 400-hp. Allis-Chalmers electric motor. U. S. Rubber Co. "Giant" suction hose is used. Formerly two 10-in. pumps driven by 400-hp. motors were used with the two dredges operating in series to handle the same amount of material about an equal distance.

The dredge-line is composed of 20-, 40- and 50-ft. sections of 12-in. Armco spiral welded-steel pipe. At present about 900 ft. of the pipe is over water and is supported on oil-drum pontoons. Each pontoon consists of 12 drums which are coated with asphalt paint. Every third pipe joint has a 12¾-in. by 24-in. U. S. Rubber Co. dredge sleeve. All the other joints are connected direct with Dresser couplings.

According to Mr. Buechler, the manganese pump liners used in this pump last from three to four times as long as similar liners in the old pumps which did not have water seals. The first shell on this new pump handled 58,000 tons of material and was then rebuilt by electric welding at a cost of $300. Amsco manganese liners were used to reinforce the shell and zinc was poured behind the liners to back them up. The surface was then welded and built up with Amsco rod. This shell handled 63,800 tons of sand and gravel before it was again worn down. A new shell was then installed and this has been rebuilt twice and is now serving its third term. The material in the company's deposit is among the most abrasive used for aggregates anywhere and tests made by the highway department of the state show only from 2.92 to 4.56 per cent. of wear under standard tests.

The original pump shell was again



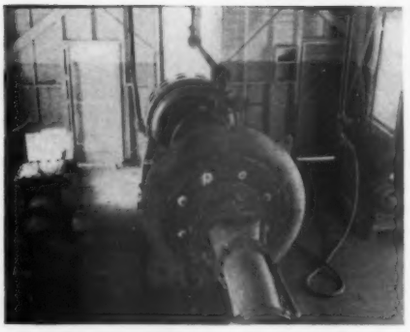
The 12-in. pump and 400-hp. motor on Dredge No. 1.

partially rebuilt and is now used at the plant end of the dredge pipe-line to break the force of the discharge. From the shell the material drops into a 4-ft. by 12-ft. revolving scalping screen. The oversize is reduced by two Allis-Chalmers crushers, a 6-in. Newhouse and a 7-in. McCully. The sizes of the screen and crusher openings can be changed to meet any demands. Material passing through the screen formerly dropped with the dredge water into a steel-lined wooden flume which has been replaced by a concrete structure with 10-in. walls in which the material forms its own bottom and absorbs all wear. Formerly the constant relining of the flume cost about $500 annually in labor and materials and loss of production time.

The screening plant as seen from the car-loading building.

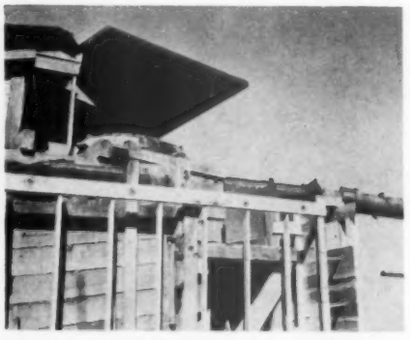
This material overflows into a sump, where it is combined with the crushed gravel. Excess water and silt are allowed to overflow here. A dewatering bucket-elevator raises the material into a surge bin from which it is discharged on a 30-in. belt-conveyor running on 310-ft. centers to the screening plant. The first two pairs of conical screens have been retained. The first pair has 1½-in. round perforations and of the second pair of screens one has 1-in. and the other has ¾-in. round perforations. The third pair of conical screens was replaced in January, 1936, with two 4-ft. by 6-ft. Universal single-deck vibrating screens. These are fitted with Ludlow Saylor wire cloth having 9/32-in. square openings and No. 14 wire and are equipped with sprays.

The "doodle-bug" which disposes of overburden in worked-out sections of the pond.



Another view of the dredge pump, motor and intake-and-discharge lines.

The fine material passing through the vibrating screens flows over stationary screens with 7/32-in. round perforations. The material passing through these stationary screens is blast and masons' sand and goes to one of two gravity-flow sand-boxes for dewatering. The oversize from these screens is ¼-in. concrete sand as about half the fine sand in the material washes over the stationary screen. Valves discharge the dewatered products of these screens into stock-piles. The two sand-boxes replaced the original sand-drags.



The dredge pipe-line discharges through an old pump shell.

The various sizes of sand and gravel are reclaimed from storage singly or in any desired blend on a 30-in. tunnel belt-conveyor leading on 255-ft. centers to the car-loading building. A 2-deck, 3½-ft. by 6-ft. Universal vibrating screen has been installed here to insure the removal of all the fines from the coarse sizes being shipped. This screen is equipped with sprays and has ⅜-in. perforated plate on its top deck to absorb the shock load and ¼-in. wire cloth on the bottom deck. When sand is being loaded, it by-passes the screen direct to a car-loading chute. When roofing gravel is ordered ¾-in. gravel from the stock-pile is discharged on the screen and the material passing through the top deck is chuted into cars on a second track. The ⅜-in. to ¾-in. material retained on the top deck is also chuted into cars and is rehandled by a crane into a small hopper over the pump shell at the end of the dredge pipe-line. With this system 300 to 400 tons per hr. can be loaded into cars.

One of the two 4-ft. by 6-ft. fine-sizing vibrating screens.

In October, 1936, an old 3-compartment steel bin with a total capacity of 125 cu.yd. was arranged to be used for truck loading. Material intended for this bin is also washed on the car-loading screen and is carried on a 24-in. by 60-ft. cross belt-conveyor to the truck-loading bin. Trucks are loaded under the bins through clam-shell gates. Formerly, when it was necessary to load trucks by hand labor, only 400 cu.yd. was shipped monthly in this manner. Now the average is 1,500 to 2,600 cu. yd. monthly. Most truck shipments are made to Victoria, and a truck can now be loaded and make the round trip in one-third of the time formerly required.

U. S. Rubber Co. belting is used on all the belt-conveyors.

The overburden on the deposit ranges from 6 to 18 ft. in depth. Formerly from 3 to 5 hired trucks were kept busy hauling this material to waste. The present "doodlebug" sys-

The pipe-line is carried on pontoons from dredge to shore.

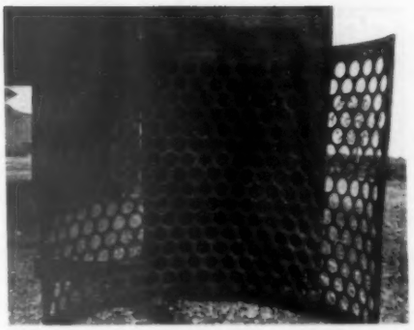
tem of disposal was devised by Mr. Buechler and was built at a cost of about $2,000. This system disposes of about the same amount of material formerly handled by the trucks and has the advantage of being unaffected by adverse weather conditions. With this system the waste is dumped into the worked-out section of the pit 100 ft. from the shore. Only one man is required to operate the system, which has saved the company $40 daily since it was put in operation.

The same P&H gasoline crawler drag-line with a ¾-cu.yd. Page dragline bucket which formerly loaded trucks is used. The overburden is discharged into a steel hopper mounted on pontoons at the shore end of the system. A standard-gage end-dump car of about 6-cu.yd. capacity runs on 80-lb. rails which are 100 ft. long and

Local deliveries of material are made by motor truck.

are also on pontoons. A system of levers on the side of the hopper loads the material automatically through a sliding gate into the car, which then runs out to the end of the rails and automatically dumps its load. A hoist operated by a 20-hp. gasoline engine operates the car by means of a cable, a drum and a pair of gears. The gate under the hopper is automatically closed as the car leaves and the hopper has sufficient capacity to hold the output of the shovel during the short time required for the car to make a round trip.

The plant as it appeared when the Guadalupe River went over its banks.



Section of scalping screen renewed by welding.

Under Mr. Buechler's management the use of welding equipment and hard-surfacing metal has been developed to an unusual extent and has resulted in substantial savings. The rebuilding of pump shells has already been mentioned. Other equipment which is successfully salvaged by rebuilding and hard-surfacing includes pump impellers, elevator-bucket lips, rollers, screen plate, crusher mantles and concaves, drag-line buckets, etc. This work is done with a Lincoln electric-welding machine purchased when the plant was built. Lincoln welding and hard-surfacing rods are used on some of the work.

One of the illustrations shows half a section of a 4-ft. scalping screen. A

Gears and crusher mantle rebuilt with welding rod.

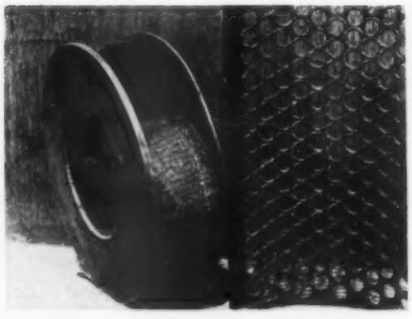
portion of about 12 in. at the receiving end of the screen, where the material dropped from the chute into this screen, wore very much faster than the rest of this same section. It was taken out and rebuilt by electric-arc welding using Stoody rods. The cost of this job was less than 12 per cent. of that of a new screen. In doing this job the plate warped a little, but no trouble was experienced in installing it after the rebuilding. It gave twice the service it had given when new because the rod used is made of very much harder metal than the original plate.

Another picture shows three different gears for use on a ¾-cu.yd. P&H dragline which have been used over six years. They have been rebuilt and are ready for use as soon as ground smooth with a common portable carborundum grinder. Rebuilt gears give the same service as new ones and the saving amounts to about 80 per cent. The bottom half of a rebuilt McCully crusher mantle is also shown. The material used on this job is Amsco manganese welding rod, and the saving amounts to about 50 per cent.

In another photograph is shown a pump shell that has already produced more than 120,000 tons of sand and gravel and is ready for at least 50,000 tons more. This shell has had two runs of about 60,000 tons each and has been rebuilt the second time. The liners have been welded in the shell after the

Pump shell after new liners were welded in.

extremely worn places have been filled with pieces of automobile springs welded in the liners in the shape of a half moon. They fit closely the curvature of the shell and are welded into their proper places, the welding being done on each side and through a 1½-in. hole in the center of the liner. When this is done, zinc is poured into the space left between the liner and the shell. This makes a solid job. The liners are of Amsco material cast to the company's pattern and order. The complete cost of rebuilding a 12-in. shell is on the average about $300. The rebuilt shell gives the company the



Welding was also employed to reclaim this pump impeller and screen section.

same tonnage as, and sometimes more than that of, a new shell that costs about $750, freight included. This is a saving of about $450 every 50 to 60 days.

Another half section of the same kind of screen as previously described has been rebuilt entirely at a cost of 50 per

cent. of that of a new screen. It gave twice the number of hours of service that the original had given. It can be seen in another of the illustrations, which also shows a pump impeller that has been rebuilt and is ready for another run at least equal to the first run. The cost is about one-fourth that of a new runner. The material used on this runner is Amsco manganese rod surfaced with Stoody metal.

"There is no end of saving of this kind in the production of sand and gravel," according to Superintendent Buechler. "There are however, three things that enter into the repair of such items. You must have: (1) a man who knows what he is doing and how to do it; (2) the right kind of rod for each particular job; and (3) a welding machine of the proper amperage."

Testing

(*from page 73*)

beginning of their existence to the action of a capillary liquid. Such substances are clay, paints, cements, and sedimentary rocks in course of formation. The experiments reported in this paper concern this theory as applied to cements, and lead the author to believe that the *rôle* of the liquids in the setting of cements and in the agglomeration of fine particles is to serve as intermediaries for the attraction of the surfaces.

Grading and Workability, by W. H. Glanville, Building Research Station, Garston, Herts, England.—This paper is concerned with the measurement of workability and the effect of grading on it, and treats in detail the slump test, which, while unsatisfactory as a measure of workability and as a laboratory control of water content, has served a good purpose in providing a check on the use of excessively-high water contents. The water-cement ratios (and their corresponding strengths) required to produce three degrees of workability which are described as "low, medium, and high" are tabulated. The tests are being contained and extended to cover different aggregates and to explore additional gradings.

Influence of Temperature on the Strength of Concrete, by N. Davey, Building Research Station, Garston, Herts, England.—In the testing of concretes from various cements the behavior of high-alumina-cement concrete at low temperatures has been found to be very satisfactory; in the case of Portland-cement concrete the retarding effect of low temperatures was quite marked because in the small specimens tested the heat of hydration was dissipated rapidly. In the case of concretes cured at high temperatures the strength development of Portland-cement concrete is hastened by warmth, but the strength of high-alumina cement falls off and may drop to only 25 per cent. A series of tests to determine whether the retrogression in strength of high-alumina cements when cured at elevated temperatures is permanent is being carried out at the Building Research Station.

The Autogenous Healing of Cement and Concrete: Its Relation to Vibrated Concrete and Cracked Concrete, by Leslie Turner, London, England.—Neat cement and mortar specimens broken initially at 1, 3, 7, and 28 days, refitted and held together with rubber bands and placed in water until retested after periods of 1, 3 and 6 months, showed recoveries of from a small percentage of the original strength up to 139 per cent., depending on the relative age at the first and second breakings and on the other factors incident to cement testing and curing. Similar tests were also carried out in compression; in most cases increases in strength up to 37 per cent. were recorded, although it is apparent that the healing is related to the initial damage sustained.

Influence of Petrographic Properties of the Aggregates on the Strength and Hardness of Concrete, by Dr. A. Kral, Ljubljana, Jugoslavia.—Test specimens made with aggregates of a number of mineral groups were tested in tension and compression. The compressive strengths showed comparatively little variation, the carbonate group (limestone and dolomite) in general showing better results than the igneous rocks. The variations in the tensile strengths were pronounced, the concretes made with the carbonate aggregates running 25 to 50 per cent. higher than concretes with aggregates of the igneous groups. The carbonates also showed greater hardness (resistance to wear), but this difference is ascribed to the cement substance.

Testing of Aggregates for Durability in Concrete, by A. T. Goldbeck, engineering director, National Crushed Stone Assn., Washington.—This paper discusses the sodium-sulphate soundness test as "the most-widely accepted accelerated durability test" to determine by laboratory tests the probable degree of weather resistance of aggregates in concrete; the test method now described in the tentative standards of the A. S. T. M.; the recommendations of Garrity and Kriege (1935); and present experimentation on freezing tests. The status of accelerated soundness tests is summed up by stating that they are not sufficiently reliable for use in setting definite test limits in specifications and should be used primarily as danger signals. If they indicate unsoundness, thorough field investigations should be made to determine the service value of the aggregate.

Chemical Lime

(*from page 70*)

and all the doors and windows are of the steel-sash type. The company's forces also poured all the concrete, including that used for the bins and silos which were erected with steel Metaforms. Stone taken out in sinking the slope was used in the concrete and for surfacing the drives and property.

Compressed air for the mine and plant is supplied by an Ingersoll-Rand Imperial Type No. 10 compressor with 12½-in. and 20-in. by 14-in. cylinders. This is driven at 257 r.p.m. by a 200-hp. motor and supplies air at a pressure of 100 lb. per sq. in. The compressor is equipped with an aftercooler. The proper drive-belt tension is maintained by the Rockwood base on which the motor is mounted. An American air filter on the compressor intake cleans the entering air.

Water is obtained from a deep well and is stored in two 12,000-gal. underground steel tanks on the hillside above the plant to which it flows by gravity.

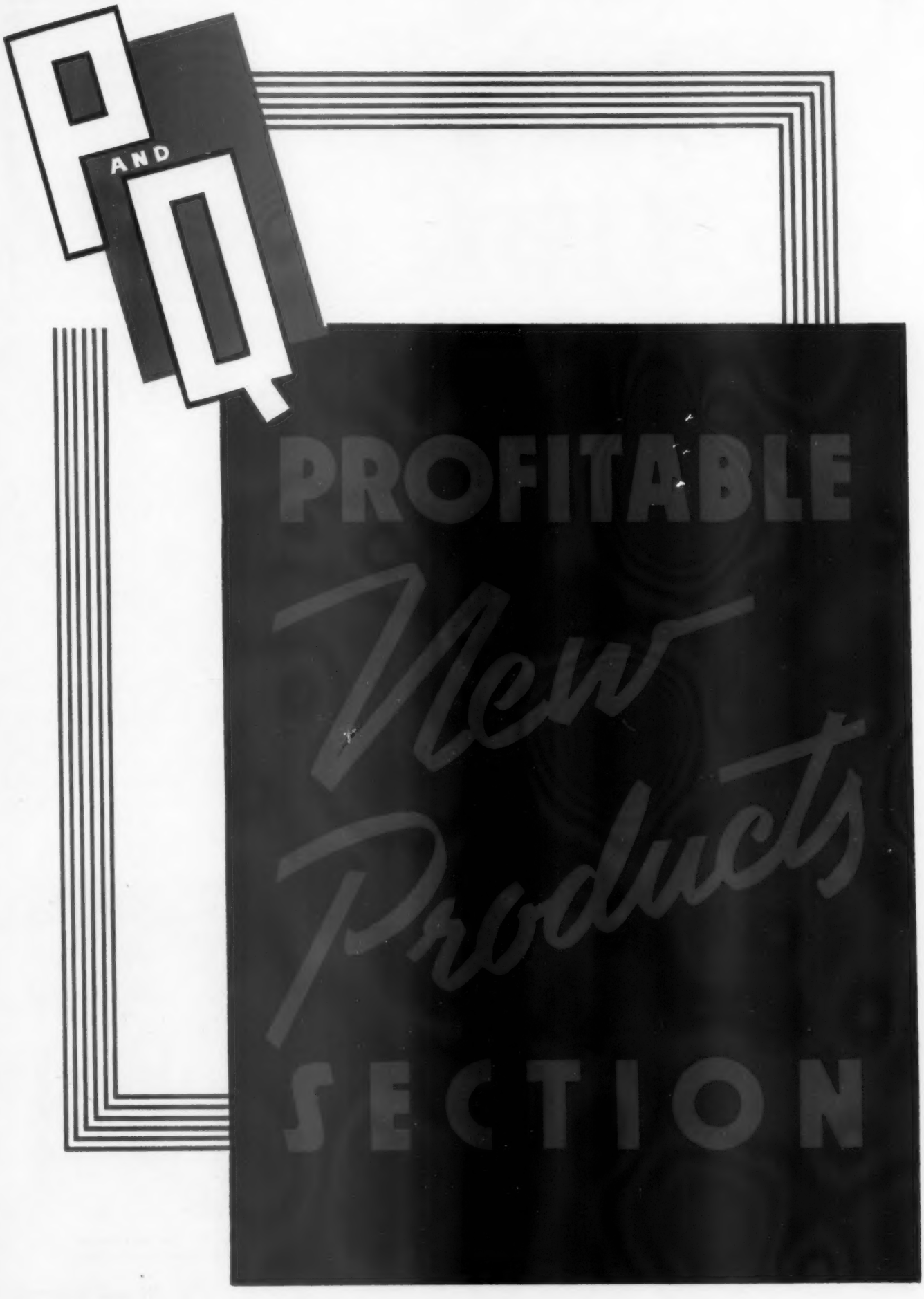
The explosive magazines are located, in accordance with state regulations, north of the plant.

The mine hoist is located in the blacksmith and machine shop. The shop equipment includes a forge, drill press, lathe, drill sharpener, and other required tools.

The officers of the Chemical Lime Co. are: Willard L. Case, president; Robert S. Walker, vice-president; Thomas M. Brown, vice-president; Robert M. Gehret, secretary and assistant treasurer; W. J. Emerick, treasurer and assistant secretary. S. H. Smith is general superintendent. Bayard Magee is plant-maintenance engineer and Henry Auvinen is mine captain.

Use of Glass for Building Increases

Glass is becoming increasingly important as a material of construction. An office building consisting largely of glass was erected in New York recently, and 800,000 glass tiles were used in the ceiling of the new midtown Hudson Tunnel at New York. Panels of glass blocks set in brick walls serve as windows in factories. The Owens-Illinois Glass Co. reports a large increase in sales of glass blocks for building purposes.


P AND Q
PROFITABLE
New Products
SECTION

A street of attractive houses built of concrete bricks.

SURPLUS AGGREGATE YIELDS A PROFIT

A YEAR ago the Riverside Sand & Gravel Co., Inc., of Thiensville, Wis., had thousands of cubic yards of good small-size coarse aggregate that had no market. How to dispose of this at a profit was a problem that J. A. Krause, secretary and treasurer, undertook to solve. This led him to an investigation of the conditions in the Milwaukee building-material market.

The natural first thought was the manufacture of the conventional concrete block but a study of this soon brought the conclusion that this field was overcrowded and after all that the use of this type of unit is largely limited to foundation construction. But further discussion with builders brought out the fact that what was lacking was a low-priced, all-purpose unit, and the answer to that was brick in standard and multiple sizes.

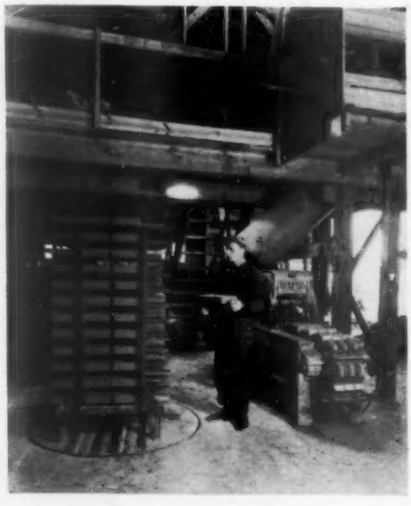
Carrying his investigation farther, Mr. Krause found that the bulk of the bricks used in this area were shipped in a manner that in many instances represented 25 per cent. or more of the cost of the bricks themselves. The local supply was of an inferior grade and very limited as to choice of color.

Further discussion with prospective builders and contractors disclosed that the demand was for better, permanent, fire-safe building which necessarily means the use of permanent materials but each of them stressed the fact that the costs must be reduced and, of course, to get reduction in costs the first cut must be in the materials and processes used. The next step is that the units must be of a quality and design that will be a factor in reducing labor and mortar costs.

With that objective in mind, Mr. Krause visited the plant of the W. E. Dunn Mfg. Co. at Holland, Mich. After seeing his own aggregate made into "Dunbrik" and seeing the improved methods of construction and the cost reductions that could be affected by the use of "Dunbrik" and "Dunstone," Mr. Krause saw the opportunity of turning his waste aggregate into a profit. This resulted in the organization of the Riverside Dunbrik Co., Inc., with Mr. Krause as president, W. Richter, secretary and treasurer, and W. W. Whitney as sales manager.

Now, after a year's operation let us visit the Riverside Dunbrik Co. and talk to Mr. Whitney, the sales manager. We find him enthusiastically telling us of the acceptance of his company's product by the Milwaukee building trade and the public. The reasons are numerous. For instance, the patented recess design of the brick lightens its weight, a feature particularly welcomed by the building trade. The absolute uniformity in size and shape is proving a tremendous advantage to the contractor in savings in labor and in the execution of the most intricate architectural designs. The strength of the product, as well as its ability to produce a good wall when bonded with a cement mortar, has greatly helped in securing some large orders for heavy industrial construction. In residential building the ability to furnish a wide range of colors without premium prices has been a big factor and a constantly increasing volume of business in this field has resulted.

Bucket which raises and dumps cement and aggregates into mixer.



A view in the plant showing operator racking units as they come from the machine.

The multiple sizes have proved advantageous in making sales on jobs where the architect or owner wanted something beyond the ordinary in appearance and a reduction in construction costs. These units, being exact multiples of the standard-size brick, greatly reduce the labor and mortar cost per square foot of wall and have opened a market in a field that previously was confined to inferior short-lived materials.

Further, Mr. Whitney explains that probably the most gratifying fact is that once he has sold an architect or a contractor repeat orders are received without any further sales effort on his part beyond a periodical mailing consisting of a letter and the inclosure of some of the pieces of literature furnished by the machinery manufacturer.

But here Mr. Krause, who is now dividing his time between the sand-and-gravel business and the brick business, reminds Mr. Whitney that he is overlooking a most important factor and that is the large new market that has been created for aggregate. "In previous years," said Mr. Krause, "where we sold a contractor a few yards of aggregate for foundations, basement floors, walks, etc., we now sell him bricks for the walls of the house. Say it is only a small average house using 15,000 bricks; that means an additional 21 cu. yd. of aggregate. Then consider some of the larger jobs, such as the Chain-Belt factory addition which is now under construction using 260,000 Dunbriks, or 364 cu.yd. of aggregate; the Milwaukee County Garage, a P.W.A. project using over 150,000 Dunbriks, or 210 cu.yd. of aggregate; and all this aggregate going into a market that was previously beyond our reach."

The factory, where Mr. Krause proudly shows the operation of his equipment, consists of a shovel-type mixer installed overhead. An automatic conveyor hoist, the bucket of which is installed in a pit below floor level, allows easy filling with the dry materials. When filled, a pull of the control lever automatically raises the bucket, discharges its contents into the mixer, and returns it to the filling position. The water is then added through a measuring device which also is mounted within easy reach of the man handling the aggregate and cement. When the mixing is completed, the mixer bottom is opened by the ground-floor control and the entire batch is emptied into the discharge spout and the hopper of the production machine.

The brick-making machine is entirely automatic in operation. The material passes from the hopper through the feed-control gate to a continuous mold-box compartment, which then passes under a series of tampers and trowel arms which pack and trowel the material at the rate of 600 strokes per min., each tamper being capable of exerting a blow of 6 tons. The completed bricks then pass out to the end of the machine at the rate of 2,000 per hr., 3 on each pallet, and are passed on to steel racks on which they remain overnight. They are then moved out by means of a lift jack and stock-piled in the yard for further curing.

From yard storage the units are taken direct to the job by motor truck.

Surplus aggregate at the Riverside plant is being absorbed by the concrete-brick plant.

In walking through this stock yard, Mr. Krause revealed that his cost of common bricks was a matter of about $4.00 in labor and cement, plus 1.4 cu. yd. of this aggregate per 1,000 bricks. Then pointing to several piles of attractive buff, red and brown bricks, he explained that those were solid-color Dunbriks comparable to most good grades of face brick and these were made in the same manner as the common bricks with the exception of the addition of specially-prepared, waterproofed, mineral coloring that is added to the dry material before mixing. These face bricks sell at prices $5 to $7 per 1,000 above those asked for common bricks, depending on the color.

In completing our walk through the storage yard we recalled that nowhere had we seen any of the attractive glazed brick or Dunstone we saw in the office display or in some of the buildings Mr. Whitney had shown us earlier in the day and naturally the question arose—"Why not?" Smiling, Mr. Krause explained that that was one of the big advantages he had in the mat glazing process. "No inventory to carry," said Mr. Krause, "and yet when an architect, builder or owner makes his choice of texture and color, regardless of what they might be, all that is necessary is to take common Dunbriks or Dunstones from the stock yard, and by a pneumatic application of a waterproofed

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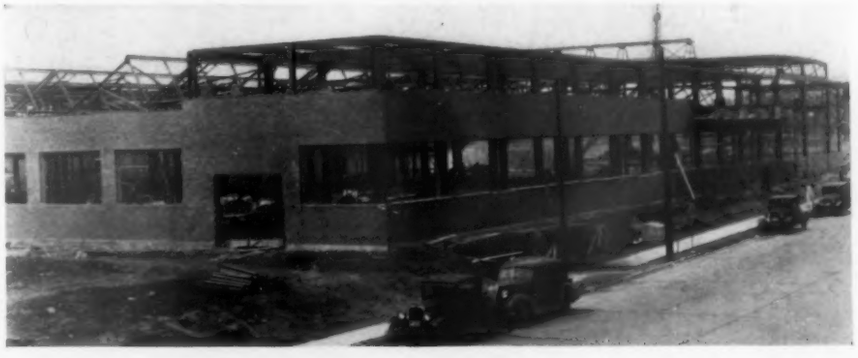


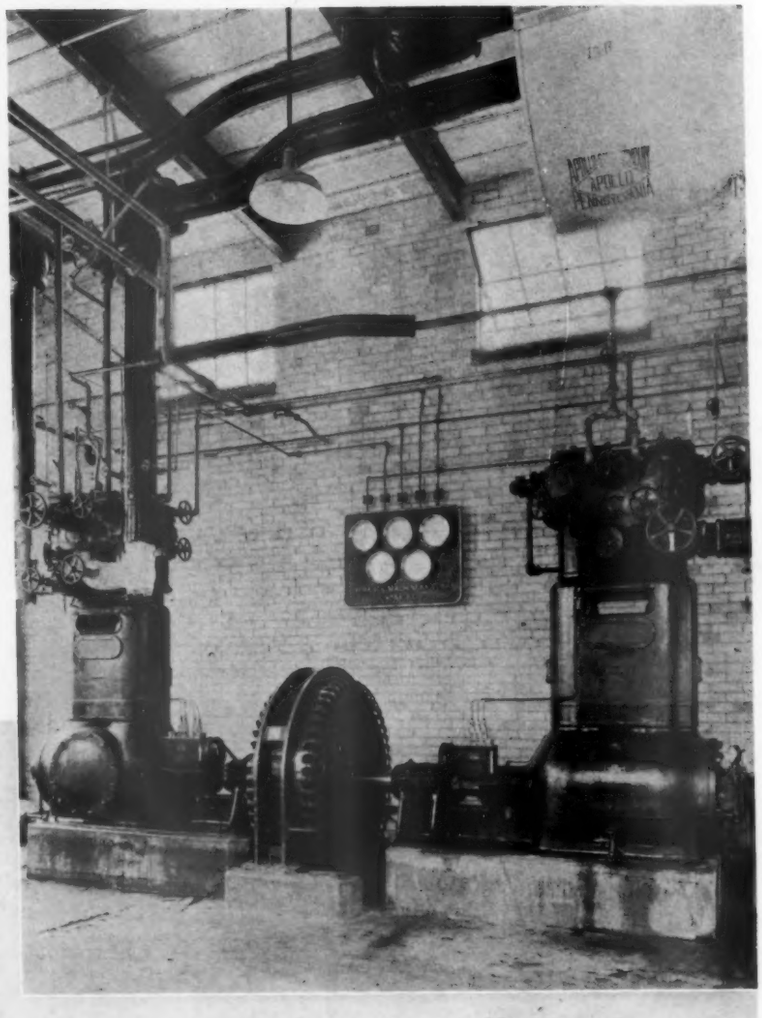
Addition to Chain Belt Co. plant at Milwaukee. About 360 cu.yd. of aggregates went into the 260,000 bricks used on this job.

By DR. E. P. GILLETTE
Vice-Pres., Gillette Research Corp.
and
F. B. KINLEY
York Ice Machinery Corp.

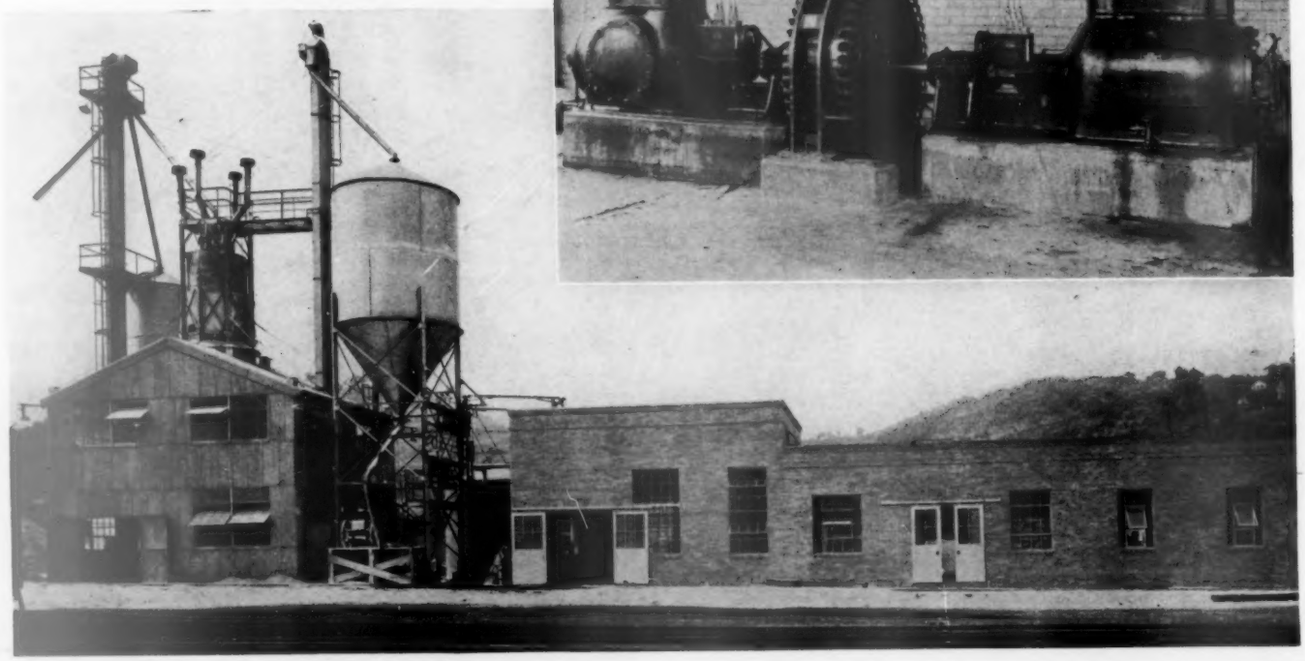
How Dry Ice Is Manufactured from Carbon-Dioxide Gas

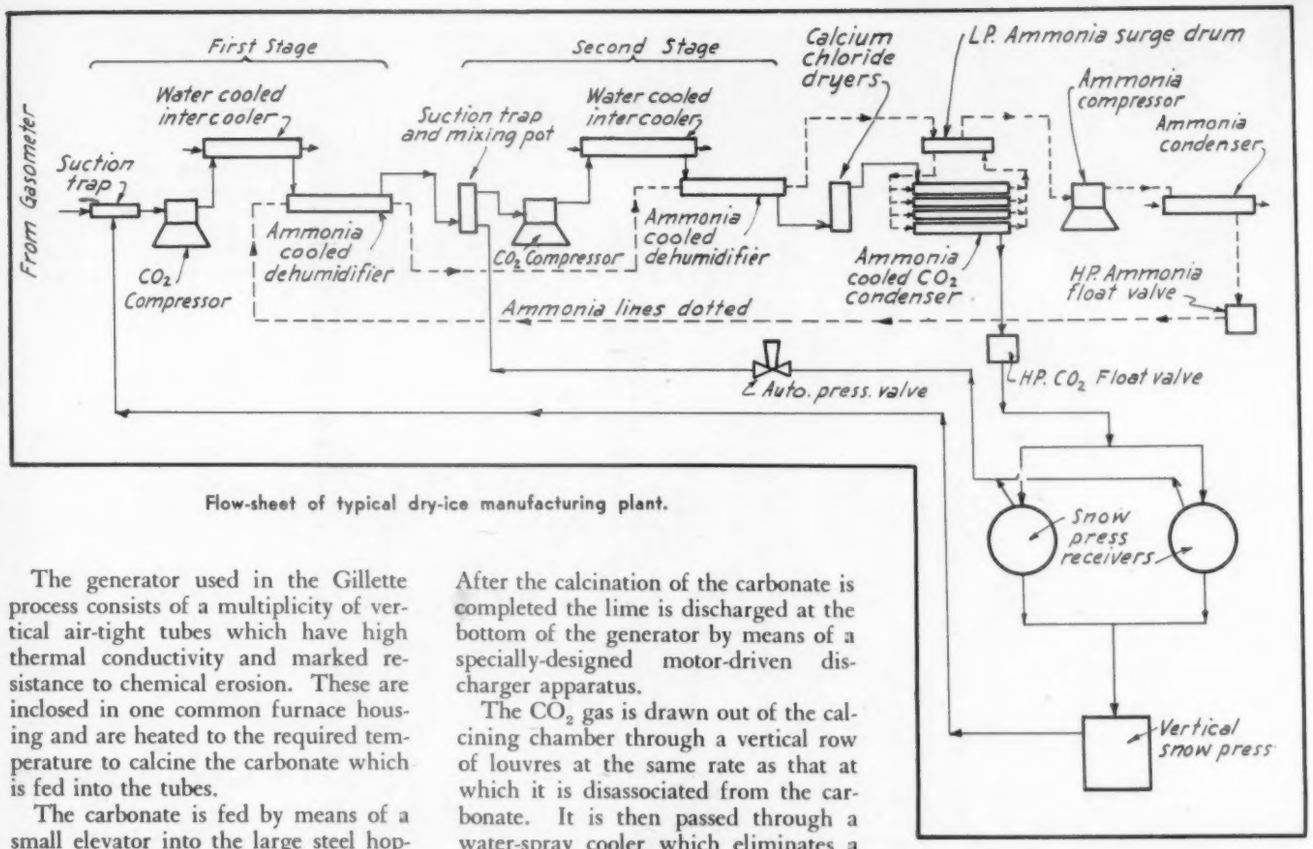
THE growing popularity of solid-carbon-dioxide refrigerant, or dry ice as it is commonly called, has aroused the interest of manufacturers whose regular processes yield recoverable CO_2 gas that can be utilized as a by-product. Makers of cement and lime are giving increasing attention to the profit-making possibilities of this new potential function of their business and at least one cement company has built and operated a plant erected for making dry ice from its waste carbon-dioxide gas.

Interest in the business opportunities in dry-ice manufacture naturally leads to interest in the methods and equipment used in making this refrigerant. The process and the necessary equipment, as this article shows, are neither highly complicated nor unduly expensive. Dry ice can be manufactured and sold at a profit in many urban centers, or in locations near such centers, provided there is sufficient potential demand for the product. The average selling price leaves an ample margin above production costs to justify the capital expenditure involved.



RIGHT—Compressors direct-connected to a synchronous motor. BELOW—A 10-ton dry-ice plant. Generator equipment is in sheet-metal building at left.

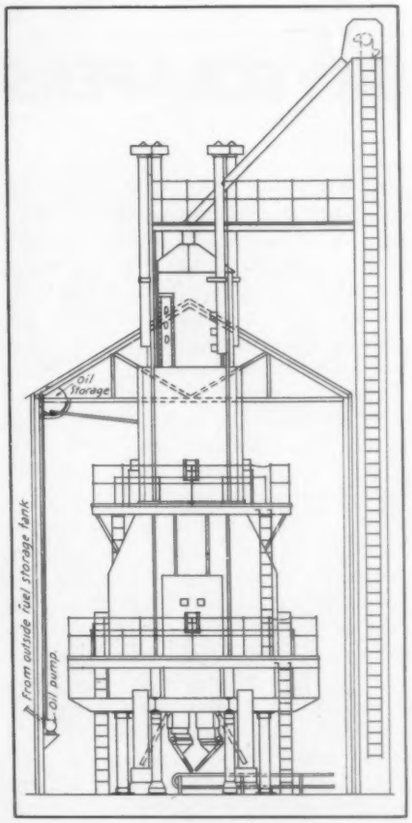




Flow-sheet of typical dry-ice manufacturing plant.

The generator used in the Gillette process consists of a multiplicity of vertical air-tight tubes which have high thermal conductivity and marked resistance to chemical erosion. These are inclosed in one common furnace housing and are heated to the required temperature to calcine the carbonate which is fed into the tubes.

The carbonate is fed by means of a small elevator into the large steel hopper which is located at the top of the generator and from this hopper it falls by gravity into and through the tubes.



Sectional sketch of the generator equipment and the stone elevator.

After the calcination of the carbonate is completed the lime is discharged at the bottom of the generator by means of a specially-designed motor-driven discharger apparatus.

The CO_2 gas is drawn out of the calcining chamber through a vertical row of louvres at the same rate as that at which it is disassociated from the carbonate. It is then passed through a water-spray cooler which eliminates a small amount of the lime dust that is carried out with the gas and at the same time cools the gas to atmospheric temperature. This removal is accomplished by means of a centrifugal exhauster fan.

A mixture of various sizes of carbonates under ¾ in. is used. However, the amount in sizes below ⅛ in. must be limited.

The operation is continuous. An electric signal is given when the carbonate in the hopper reaches a determined low level, and an electric recording apparatus controls the operating temperature of the furnace. A gas analyzer records the purity of the CO_2 gas after it leaves the spray cooler and signals the operator should this purity drop below standard.

The velocity of carbonate travel through the calcining zone is uniform at any set rate and is controlled by means of a small motor-driven pawl-and-rachet discharger apparatus, which allows an exceptionally fine adjustment of the discharge rate to be made. Each tube is individually manipulated.

A standard 4-tube unit is rated at 10 tons of CO_2 per 24 hr. but produces sufficient gas to make 10 tons of dry ice per 24-hr. day. The volume of lime produced depends upon the percentage of CO_2 taken from the carbonate. Production can be varied by raising or lowering the operating temperature and balancing the discharge rate of the lime.

Larger units of any over-all capacity can be built by varying the number of tubes to meet individual requirements. The physical size of each tube is fixed.

The generator requires one operator per shift. The operator is of the common-labor class, acting largely in the capacity of a watchman of the recording apparatus.

The CO_2 gas is delivered by the exhauster fan to a gasometer, where it is ready for use.

The lime is discharged upon an apron conveyor that delivers it to a designated point.

Natural gas, "Bunker C" oil, coke-oven gas and producer gas can be used. Present commercial units are operating on oil and coke-oven gas, but there is no reason why the other two fuels can not be used. Powdered coal has not been used due to the possibility of a slag deposit on the walls of the tubes reducing the thermal conductivity.

The purity of CO_2 gas averages 99½ per cent. The lime is of the highest possible quality, due to the small pebbles originally used, plus the complete elimination of contamination by fuel gases, uniform calcination rate, temperature control, etc. The lime is burned in a uniform manner due to the absolute control of the temperature and the velocity of the carbonate travel through the calcining zone.

The fuel requirements are slightly higher than in shaft or rotary kilns because of the fact that the heat energy

(Continued on page 87)

Thousands of concrete-masonry units are now going into large structures. In Harborview Hospital, Seattle, Wash., 175,000 units were used for back-up.

By
D. R. (Spec) COLLINS
Asst. to Director of Promotion
Portland Cement Assn.

FROM BASEMENT WALLS TO SKYSCRAPERS

HERE'S an industry that distinctly has not "just growed up" like Topsy. Many years ago members of the concrete-masonry industry realized that if their material was to become not only accepted as a standard building product but was to participate in any great volume of business, they had many handicaps to overcome. The fact that the industry has overcome those handicaps and has supplied its members with a first-hand technical background is responsible for its position in the masonry field to-day. The concrete-masonry industry has grown in orderly fashion, meeting its problems squarely and overcoming them one by one until to-day its product stands a better-than-fair chance of becoming preëminent among all masonry materials.

Those of us who have followed the business since that time can well remember the furor caused in 1921, when it was discovered that a plant in Toledo, O., had manufactured and sold over a million units during the preceding year. That *was* something to get excited about in those days. A great majority of plants then in existence were in the so-called "back-yard" category. A concrete-block machine could be bought for as little as $26. Most of the people going into the business had little real knowledge of making concrete. Their sole ambition was to make a material which they could put into basements and small buildings. In addition to knowing little about concrete making, these men knew less about selling. Much of their machinery was inadequate to make a good product. Aggregates were usually the cheapest bank-run materials they could buy. Building officials rightfully refused to recognize the product. Concrete masonry to them was a material for basements and small garages and always would be. Rock-faced block, made to imitate stone, fooled no one, but was a hideous monstrosity to the architect's artistic eye.

But the industry has gone far since those days of ugly, ill-made products and can now stand unblushingly behind its product. It has so progressed in its physical set-up that we now find many splendidly-equipped concrete-products plants. It has done an amazing job of providing its members with the sales tools to do an intelligent, aggressive job of selling. That's saying a lot, unless it is backed up by facts. Those of us who are in the business, or who are interested in it, realize these things. But I doubt if many of us have sat down and chonologically charted that progress. If we had done so, it would give us a greater respect for our business and make us realize that it has carried on as logical and well-thought-out a program of development as any material business, and perhaps a better program than most. This sound program is the real reason why the concrete-masonry business will go far in the future of the building-material industry. As building picks up the concrete-masonry industry has a far greater market for its product than in the "boom" years of 1925 to 1930.

Now, what is this market going to

be? The answer is *the use of concrete-masonry units in more large structures than ever before and in concrete houses above grade.*

Let us get into a few cold figures on the subject. If you will ask the average man in the business what percentage of the home basements of the country are built of concrete masonry, I think he will unhesitatingly say 90 per cent. In so doing, he doubtless does not consider the fact that in many sections of the country such as the southeast and the far west, few homes are built with basements, and most certainly these sections have always been responsible for a good share of the home building.

The big year in the concrete-masonry industry was 1928. A careful survey made at that time showed that production hit an all-time "high" of 348,000,000 units, based on an 8-in. by 8-in. by 16-in. equivalent. According to the U. S. Department of Commerce, 710,000 houses were built that year. Let us say that 50 per cent. of these had concrete-masonry basements—800 units to a basement—that would mean that 284,000,000 units went into basements that year —77 per cent. of the total production.

Estimates, based on the same 8-by-8-by-16 equivalent, indicate that the production for 1936 was 225,000,000 units. The Department of Commerce states that 250,000 houses were built during 1936. If 50 per cent. of them had concrete-masonry basements, it would account for 100,000,000 units of the year's production, or 56 per cent.

Now let us contrast these two figures. In 1928 77 per cent. of the production of the concrete-masonry industry was used below grade. In 1936 only 44 per cent. of the product went below grade. The remainder was used for back-up, for the interiors and exteriors of theaters, schools and public buildings and for the exterior walls of houses. That change indicates more clearly than anything else why there is a tremendous future for this material.

Concrete masonry was not used in all these above-grade jobs merely by chance. It was because during the depression years technical sales data had been made available and were used by aggressive concrete-masonry manufacturers to batter down a resistance that could not be overcome merely by high-pressure salesmanship. And that is why this industry will continue to progress, will continue to invade new fields.

Let us flash back to the things the industry did to bring about its development and follow them chronologically through the years.

This was a typical plant of the early days—perhaps a bit better than the average.

But as the business grew up so did the plant. This one is typical of to-day.

In 1920 little factual information about the technical aspects of concrete masonry was to be had. Few building codes recognized it, and many of those that did placed low limitations on it. So the industry decided to police itself. In some 80 localities local concrete-products associations were formed for the purpose of securing a product having uniform quality. Many of these associations restricted their membership to operators making a product that met the A.C.I. tentative specifications, feeling that only by making such a product could they secure recognition by their building departments. These groups in their meetings also touched on such matters as merchandising, advertising and selling. But these were of minor importance then. Through these organizations and their campaign to improve quality in their industry in 1921 work was begun to revise the building codes of some 200 localities. Because of this work started in 1920 practically every building code in the United States to-day has a provision recognizing quality concrete masonry and specifying how and where it may be used.

Another obstacle that faced the industry was some sixty or more different types of concrete blocks being manufactured. It was not possible to outline standard construction details. Work was started with the U. S. Bureau of Standards toward standardizing unit sizes. This was accomplished and in the few years following this step three standard sizes of units were adopted.

By 1923 competitors, realizing that this new "baby" was a "comer", started attacking it from every side. One of their main points of attack was that it was not fire-resistant. Believe it or not, in 1923 there was one state in which fire-insurance rates were higher on concrete houses than on wood houses, and in other states the insurance rates were much higher on concrete-block houses than they were on brick and tile. There was only one way that rate-making bureaus might be convinced that rates should be lower on concrete masonry and that was by having official fire tests made at the Underwriters' Laboratories. The industry undertook such a program and carried it through.

One of the reasons for growing popularity is the building of modern concrete-masonry houses like this.

This "rock-faced" job was considered a hot number back in the early days of the industry.

Producing machine-made blocks in the early twenties

Battery of five machines in a modern plant.

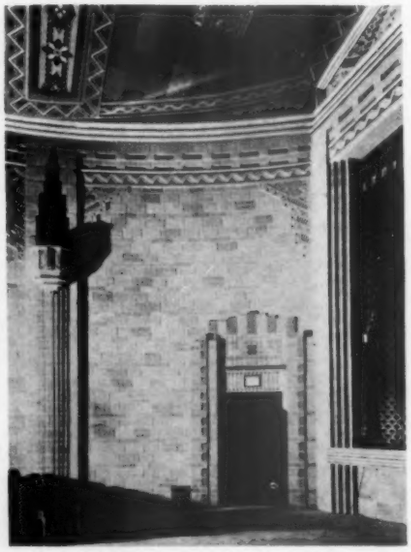
In 1924 the industry started to hear more about straight-line production, and although in many cities an excellent quality product was being made, manufacturing costs were still far above what they should be. Little attempt had been made to grade aggregate. Curing was a thing which was not practiced. The quality varied widely and the cost of the product accordingly. The industry undertook a study of plant layout and manufacturing technique. And with real conscientious thought being put on the subject production costs were lowered and another obstacle was overcome.

Fire tests were continuing at the Underwriters' Laboratories and by 1925 insurance rates had been revised in three states, giving concrete-masonry houses the brick rating.

During these years a number of demonstration houses had been built, notably the "Home Sweet Home" house at Washington, perhaps the greatest single factor in demonstrating the suitability of a material for house construction.

In 1926, using the technical information gained at the Underwriters' Laboratories, fire-insurance rates were revised in 13 more states and the material was given a classification in many building codes. By the end of 1928 rates equivalent to those for brick were in effect in 35 states. During that year over 350,000,000 units were produced. Production problems were fairly-well solved. More plants were turning out a quality product and doing it economically.

Now to develop aggressive selling of this product. Through the Portland Cement Assn., the Concrete Products Assn. and the many state and local associations the question of proper merchandising and selling was pushed into the front. Nearly 400 salesmen of concrete masonry suddenly realized that much technical information about their product then unavailable was necessary for future progress. Architects and large builders were asking many questions they could not answer—questions on wall strength, weather resistance, acoustics. A research program would be necessary to supply this material. So, at the convention of the National Concrete Products Assn. in New Orleans, a five-year program of research and development was laid out. The name of the association was changed to the National Concrete Masonry Assn. and a definite schedule of technical research in coöperation with the Portland Cement Assn. was adopted. The first plank in this research platform was a comprehensive series of wall tests at the University of Illinois. As a result of this and other research work which had gone before in 1932 the industry's first piece of technical sales literature, *Facts About Concrete Masonry,* was published. This sales booklet contained information on the principal factors affecting wall strength; comparative wall strengths of concrete masonry and competitive masonry materials; strength of composition walls; effective mortar bedding; comparative strengths of pilasters; strength of concrete-masonry walls after fire exposure; facts about building watertight walls; calculating loads; and many other chapters of technical information obtained through the industry's research program. Nine hundred-odd concrete masonry salesmen could not intelligently answer the questions about their material that were being put to them by architects and engineers.



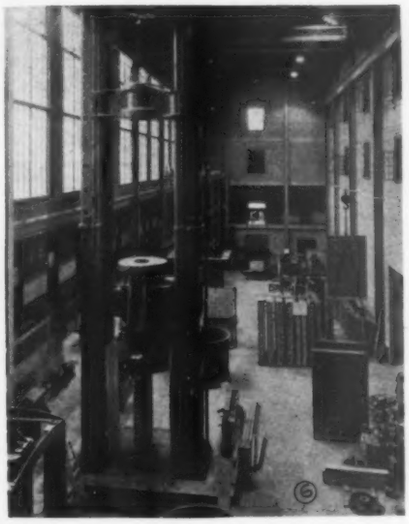
Exposed concrete ashlar units in the auditorium of a Detroit theater.

In 1932, anticipating the tremendous amount of Federal construction ahead within the next few years, the industry took steps to put into effect a Federal specification which it had secured the year previous. Although this specification had been approved by the Federal Specification Board, it was not being used, nor were the products of the industry even being considered by any major government department. The industry placed in Washington a man whose duty it was to acquaint specification writers and department heads in all the major governmental departments with *Facts About Concrete Masonry* and the technical data then available. This campaign, well-backed-up with fact, was so successful that within six months every major governmental department engaged in construction was including concrete masonry as optional with other masonry materials for both load-bearing and back-up construction.

But the industry's research program was not completed. Even though business was more than a quarter of what it had been in its "peak" year, the industry carried on toward the objectives it had set for itself in New Orleans. Tests of suitable waterproofing, of the acoustical value, of its value for insula-

tion, were on the schedule and were completed. Then in the fall of 1936 the new edition of *Facts About Concrete Masonry* was published, containing information on every one of the basic technical points outlined in 1929.

During these depression years the industry had developed its sales technique, had taken advantage of idle time on architects' hands to sit in with them and tell a story, the story of the product itself and of its technical background as well as its suitability not only as a structural material but from the standpoint of insulation, acoustics and



Testing a wall section at the University of Illinois laboratory.

decoration. Concrete ashlar had been developed during this period and a tremendous market had been opened up in the back-up field. The precedent of the United States Government specifying the material served to break down much sales resistance.

Backed by an aggressive campaign on the part of the Portland Cement Assn., concrete masonry was again drawn to the attention of the public in 1935 as the most suitable material for the forthcoming house-building boom. As a result of the advertising campaign conducted by the association in 1936, over 60,000 people wrote the general office of the Portland Cement Assn. requesting information on concrete for house construction. During that year, according to association records, concrete houses became so popular that though in 1935 3.8 per cent. of the total number of houses built in the United States were of concrete, in 1936 8.3 per cent. of the total were of this material—enough houses to care for a town of 70,000 population. The trend was pronounced and continues to be so.

Now, in all this summary of achievement I have not said one word about basements. It was to get out of the basement that this program of development was undertaken. Concrete masonry was undoubtedly suitable for basements, but the market for such a use was limited. If the industry was to succeed it had to place its material in walls above grade. That is what it has succeeded in doing. In fact, where seven years ago it was only with a terrific battle that concrete masonry could be included in specifications for such structures as schools, offices, theatres, factories, such a specification to-day is generally accepted.

The industry still has its basement market. That might be called its backlog, but ahead of it is a market in every type of structure where masonry is used. Concrete masonry has every advantage of the older masonry materials but it has so many more advantages that its use is becoming more widespread and more acceptable everywhere.

Riverside (from page 81)

material mixed to a plastic mass about the consistency of mortar I can deliver faced units in a few days. This process, known as mat glazing, has greatly broadened our market. With it we can produce the most attractive building material at prices far below any competitive product of comparable quality.

"Then we have the advantage of our ability to produce many unusual colors and textures that are often demanded in commercial construction and are almost impossible to obtain in other materials. Take, for instance, the sign in our own factory building, the background of which is laid in white mat-glazed Dunbriks and the border in black mat-glazed Dunbriks. Normally a combination like this would be difficult to obtain and would mean long delay and premium prices. Here, with the aid of this process, we can supply any such combination on short notice and at a fair price.

J. A. Krause, president, and W. W. Whitney, sales manager, talk it over. In the background are display panels showing the faces and laid-up appearance of the various units produced.

"Another advantage that the mat-glazing process has given Mr. Whitney in making sales is the fact that it can be applied over a finished building as well as individual units. This factor has been particularly attractive to the man who wants colorful, permanent masonry construction at the lowest possible cost. In that case we furnish common units. The building is constructed with these at the labor cost of laying common units, which is always considerably less than laying faced bricks. Then an application of mat-glazing in whatever color the owner may desire results in an attractive, colorful structure with the added protection of all mortar joints being thoroughly sealed."

In conclusion Mr. Krause says that their already attained success in the brick business has convinced him and his associates that their next contemplated move of installing roof-tile making equipment will be equally successful and profitable. Inquiries he made among his present brick users have been overwhelmingly in favor of the use of permanent, fire-safe, colorful materials on the roof as well as the walls.

Dry Ice (from page 83)

must be transferred through the muffle wall, but a material of very high thermal conductivity is used to minimize this effect.

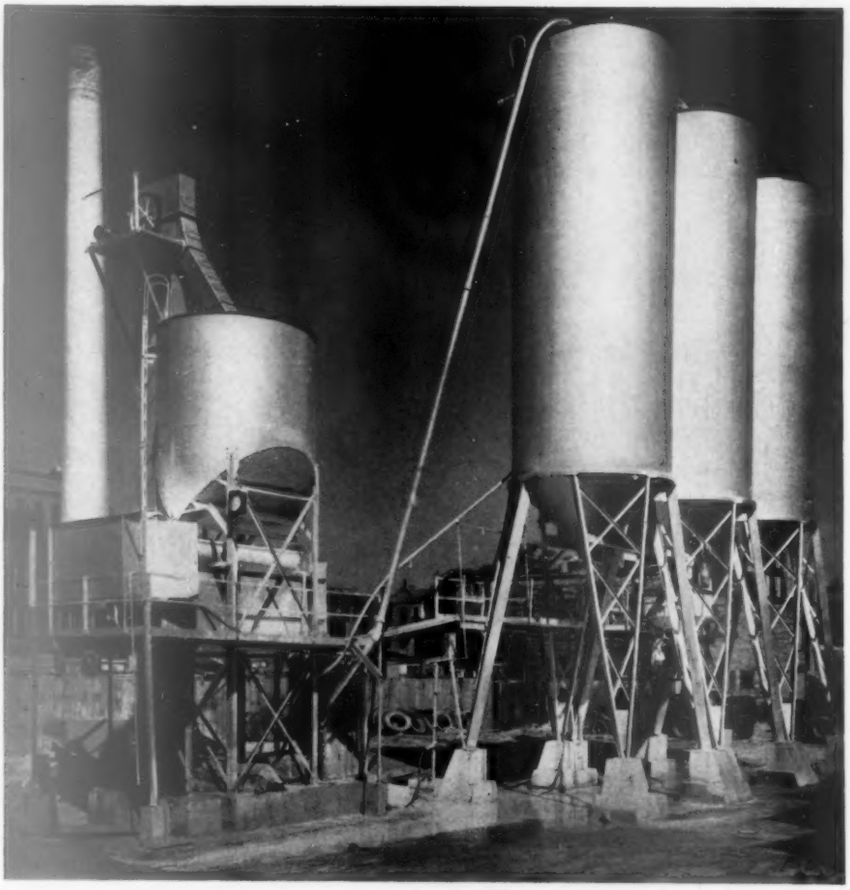
The building required to house the generator should be 30 ft. wide, 25 ft. long and 35 ft. high. The generator is 55 ft. high; the top 20 ft. projects through the roof and is protected from the weather by a steel shell. The total height of the stone elevator is 66 ft.; no building is required for the elevator. The building is of the inexpensive corrugated-sheet-iron type.

For cooling the gas and the lime discharger from 30 to 50 gal. of water per min. is required. The volume depends upon the temperature of the water delivered to the generator. When operating in conjunction with a dry-ice plant the waste water from that operation is used.

In general commercial operation an average of 2½ tons of limestone produces 1 ton of CO_2 gas and 1½ tons of pebble lime.

The over-all cost of a complete generator ready for operation and exclusive of land site will not exceed $30,000. Basic method and apparatus patents cover the generator and licenses to build

The BROOKS-TAYLOR *Lime Putty Plant*



LIME *at its best*

The Brooks-Taylor Lime Putty Plant is a complete unit for producing and handling aged lime putty. The dry lime is elevated to a storage bin, slaked mechanically and pumped into ageing tanks where the excess water is removed by means of special filters. The finished putty is withdrawn from the ageing tanks into a measuring batcher and dumped into delivery trucks by gravity.

The value of lime in making brick mortar and plaster is generally accepted. The use of lime putty produced by the Brooks-Taylor method, however, has certain definite advantages.

The correct slaking temperature is determined for each different grade of quick lime. After this is done, the lime is slaked under thermal control, without regard to the amount of water and lime used. This assures the lime manufacturer that his lime is completely and properly slaked and that it will give the user the highest plasticity and the maximum putty yield. Every batch is slaked in exactly the same manner, assuring uniformity. Unslaked lumps and foreign particles are screened from the putty. After being thoroughly aged, the putty can be kept at the proper consistency in the tanks for long periods of time if necessary. In other words, it is *lime at its best*.

For further information on the Brooks-Taylor process or equipment, address either the Brooks-Taylor Company, Birmingham, Ala. or the nearest office listed below.

CHICAGO BRIDGE & IRON COMPANY

Chicago	2451 Old Colony Bldg.	Tulsa	1648 Hunt Bldg.
New York	3389—165 Broadway Bldg.	Birmingham	1503 North Fiftieth St.
Cleveland	2264 Rockefeller Bldg.	Dallas	1486 Liberty Bank Bldg.
Philadelphia	1645—1700 Walnut St. Bldg.	Detroit	1552 Lafayette Bldg.
Boston	1550 Consolidated Gas Bldg.	San Francisco	1092 Rialto Bldg.
Houston	2919 Main Street	Los Angeles	1457 Wm. Fox Bldg.

B-504 **Plants at BIRMINGHAM, CHICAGO and GREENVILLE, PA.**

and operate are issued in the United States and foreign countries.

From all available information this method of producing pure CO_2 gas is low, due to the market value of the by-product lime and to the fact that the gas leaving the generator is in a pure state, thereby eliminating the collecting, separating, purifying and deodorizing operations.

As has been pointed out, the Gillette generator is capable of producing a high-quality CO_2 gas at a low cost. In order to realize and capitalize these economies in the final production of dry ice the York Ice Machinery Corp. highly-developed compression and solidifying system is employed. This dry-ice manufacturing system, as used in conjunction with the Gillette process, is the result of careful and complete study based on actual data secured from the operation of test installations, substantiated and proved by larger plants operating under commercial conditions. Each piece of apparatus in the plant is designed for its particular duty and is not a modification of conventional refrigerating or compression apparatus. Thus these plants are much more than a mere combination of gas compressor, condenser and snow-press; they are complete units designed to produce continuously and economically a uniformly high grade of solid carbon dioxide, requiring no expert attention in their operation and being capable of giving many years of trouble-free service.

In the York cycle the carbon-dioxide gas is taken from the gasometer through a suction trap, where the raw gas is mixed with "blow-back" or re-cycle gas and passes into the first-stage compressor. This compressor discharges the gas at about 75 lb. per sq. in. through a cooler which removes the heat of compression. The gas next passes through an ammonia-cooled dehumidifier, where some of the moisture is removed, and then through the second-stage trap, where the gas is mixed with "flash-gas" evolved during liquid CO_2 cooling. The gas is compressed to about 450 lb. per sq. in. in the second-stage machine, passing through the second-stage cooler and dehumidifier into the drier, which dehydrates the gas so that there is no danger of moisture freezing in any of the low-temperature apparatus. At the above pressure the pure, bone-dry gas is led to an ammonia-cooled shell-and-tube condenser, where it is converted into a liquid. This liquid is cooled in the receivers located over the snow press and then fed into the press that forms the snow, which, when subjected to pressure, produces the commercial 10-in. by 10-in. by 10-in. solid blocks weighing 50 to 55 lb. each.

The York compression unit is of du-

plex arrangement, consisting of vertical, single-acting, semi-inclosed compressors, generally arranged for direct connection to the motor. This unit consists of two first-stage cylinders for compressing the gas from the gasometer pressure to about 75 lb. per sq. in. and a second-stage cylinder for final compression to about 450 lb. per sq. in. A separate cylinder on the compression unit takes care of the ammonia cycle used for cooling the carbon-dioxide condenser and the dehumidifiers. The compressor cylinders can be equipped with partial by-passes for controlling the capacity of the machine, thereby increasing the flexibility of the plant.

The ammonia cycle, in addition to the above-mentioned items, includes a water-cooled ammonia condenser. This cycle, as well as the CO_2 circuit, is automatically controlled by York high-pressure float regulators. The CO_2 condenser is fed by gravity from an ammonia surge drum.

The usual practice, after the ice is manufactured, is to weigh and wrap each block before packing in portable insulated shipping containers especially designed for this service. These containers can be conveniently handled by lift trucks or overhead cranes. A saw is usually installed for supplying the product in any size smaller than the standard block.

With regard to labor, 3 men per shift are normally employed to handle a 10 ton plant. The engineer or machine-room operator takes care of the equipment end, including the generator operation, making minor adjustments or repairs where necessary, keeps the plant log and dry-ice production record and in general oversees, both the lime and dry-ice operations. The pressman's time is entirely devoted to the actual operation of the snow press as well as weighing and wrapping the ice. The helper, usually employed for only two shifts per day, takes care of storing the ice, shipments, handling of containers, sawing the blocks and acts as a general handy man assisting the engineer and snow-press operator wherever needed.

The space requirements for a given size compression and solidifying plant will vary, depending upon the type of drive, the storage space needed, etc. The York lay-out is designed to require little floor space; usually about 1,600 sq. ft. is sufficient for a 10-ton unit complete with storage.

Under normal conditions this type of installation operates at a load factor approaching 100 per cent. as far as the lime plant is concerned with the dry-ice plant operating as required to meet its demands.

DON'T BUY PIPE EQUIPMENT *until you do* THIS

1. Get a copy of our list of special offers in new and used concrete pipe machines and concrete pipe molds.
2. Check over the list and ask us to give you full details, price discounts on the machines you are interested in.

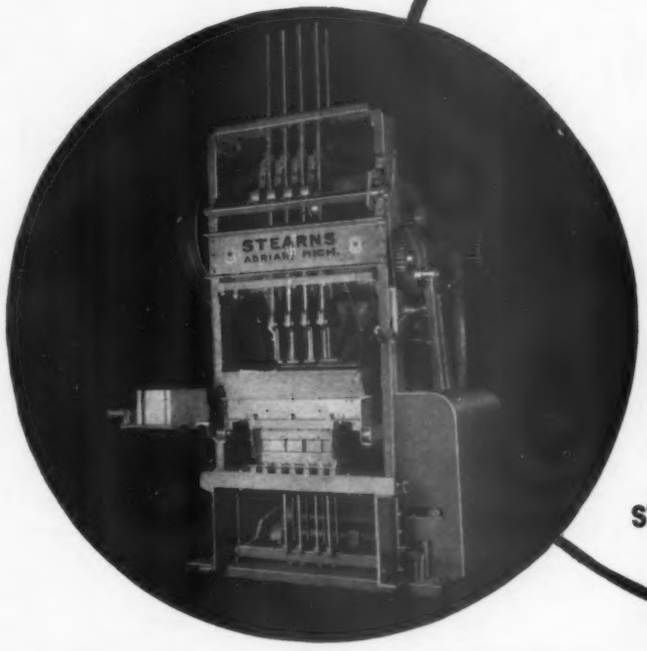
MACHINES—PIPE MOLDS

We handle every type of equipment necessary for the pipe manufacturer. Whether you purchase new or used equipment you can be sure that it comes to you exactly as we represent it to be. If you want to save money write for our listing of special offers — compare them with others. Do it today.

WRITE TODAY FOR THIS LIST

UNIVERSAL CONCRETE PIPE CO.
COLUMBUS, OHIO

STEARNS
Power Stripper



Versatile . . . . makes plain block of any size, rock face, header, manhole block, tile, brick. **Fast** . . . . capable of six operations a minute—will average four with two men. **Quality Product** . . . . output is dense, accurate to dimension, high finish, no core bar marks. **Multiple Bar Alternate Tamping** . . . . improves density, eliminates vertical seams, increases block yield per bag of cement.

We manufacture complete concrete products plant equipment—block, brick, tile, manhole block machines, mixers, tampers. Write for circulars.

STEARNS MANUFACTURING CO.
Eugene F. Olsen, *General Manager*
810 Tabor St., Adrian, Mich.

Ask or list of present users of this outstanding machine. Each plant is a leader in its territory.

QUINN PIPE FORMS

HAND or WET PROCESS

Make concrete pipe on the job with QUINN PIPE FORMS. Quinn Pipe Forms can be handled by less experienced labor and produce uniform concrete pipe of highest quality. The recognized standard of all concrete pipe.

HEAVY DUTY CONCRETE PIPE FORMS

Built to give more years of service—sizes for any diameter pipe from 12 to 84 inches—tongue and groove or bell end pipe—any length. Backed by years of service in the hands of contractors, municipal departments and pipe manufacturers.

NEW MEDIUM DUTY CONCRETE PIPE FORMS

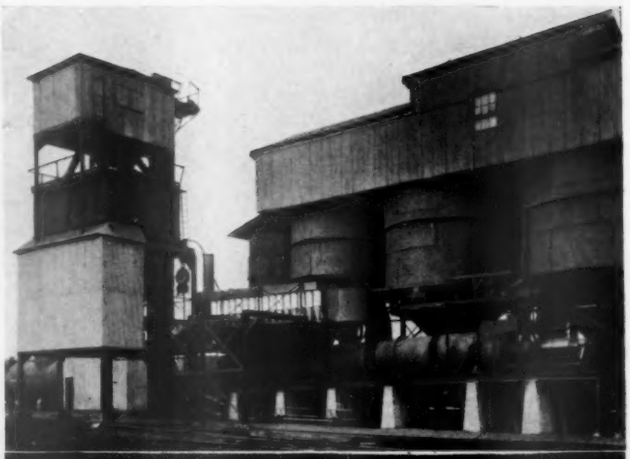
Meet the demand for low cost equipment that produces a uniform quality of pipe in smaller amounts. Complete in every way. Stands up on any job. Same sizes as "Heavy Duty," from 12 to 84 inches—any length.

WRITE TODAY

Get complete information on prices and Special Construction features of Quinn Pipe Forms. Give us size of job for estimate on your pipe form needs.
Also manufacturers of concrete pipe machines for making pipe by machine process.

QUINN WIRE & IRON WORKS

1627 TWELFTH ST. BOONE, IOWA



WARREN ASPHALT PLANTS

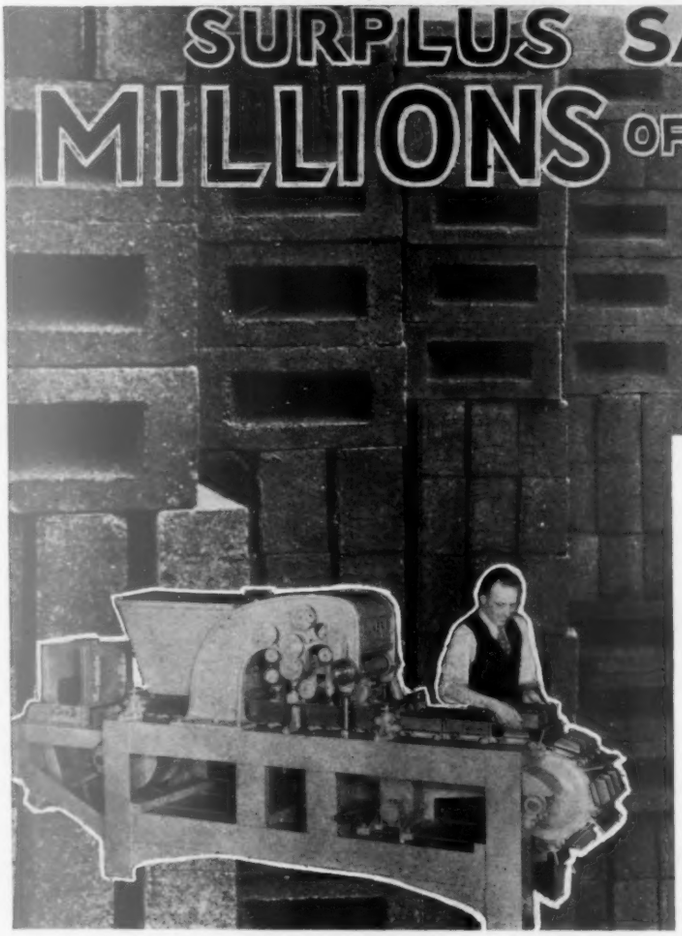
HOT MIX —— COLD MIX
—— OR ——
COMBINATION UNIT FOR BOTH TYPES

CAPACITY DESIGN AND ARRANGEMENT
TO MEET
ANY REQUIREMENTS

Designed and Built
—— By ——

WARREN BROTHERS ROADS CO.
P. O. BOX 1869
Boston Massachusetts

SURPLUS SAND INTO MILLIONS OF DUNBRIK



AGGRESSIVE PRODUCERS LIKE Consolidated Rock Products Co., Brooksville, Fla.—Riverside Sand & Gravel Co., Thiensville, Wis.—W. P. Rose, Goldsboro, N. C.—Consolidated Quarries of Georgia—Georgia Mineral Products Co., Tate, Ga.,—are converting their surplus sand into profits. Aggregate made into these modern units sells up to $12.00 per ton.

DUNBRIK AND DUNSTONE fulfill all the demands of modern building requirements—lighter weight—accuracy—greater strength—standard size brick and multiple sizes up to 12 brick and their mortar joints. And all can be produced in a complete range of colors, shades and textures.

WE EQUIP YOU with new and revolutionary line production machinery, permitting large production with only one or two men. Equipment costs but a fraction of what would be required for other processes of equal capacity.

INVESTIGATE. Write today and ask for "4 Keys to Manufacturing Success."

W. E. DUNN MFG. CO.
420 W. 24th St. Holland, Mich.

. . . here's why they're choosing JAEGER TRUCK MIXERS

WORLD'S LARGEST
LEADS IN U.S. and ABROAD
MIXED AND DISCHARGED "IN MASS"
No Segregation, Higher Strength, Easier to Work into Forms!
SMOOTH, CONTINUOUS FLOW DISCHARGE

HIGHER STRENGTH CONCRETE:

Experienced "ready mixed" operators recognize that engineers and contractors definitely prefer Jaeger Truck Mixed Concrete. This is because Jaeger end-to-end mass mixing and smooth, continuous flow discharge produce a proven higher-strength concrete that is free from segregation and easier to work into forms. To meet this demand for Jaeger-mixed concrete, operators have already purchased more than half as many Jaeger Truck Mixers as were installed during the entire year of 1936—and 1937 construction is just starting.

GREATER OPERATING EFFICIENCY:

Operators who "check up" on various types of truck mixers find that Jaeger's faster loading, dual mixing speeds on all models, two-speed discharge and quicker placement with the Jaeger One-Man Chute mean quicker trips, more payloads and greater daily earnings for Jaeger owners.

LOWEST COST OF MAINTENANCE:

Jaeger automotive construction, combining use of Man-Ten Alloy Steel (greater strength, less weight) with low center of gravity, correct load distribution even on light, short wheelbase trucks and exclusive Jaeger 3-point mounting with big diameter A.S.C.E. drum rail and rollers, gear track and thrust rollers extremely low on main frame, has resulted in amazingly lower maintenance costs for Jaeger fleets.

For complete proof of above advantages, send for Catalog TM-37 just issued.

THE JAEGER MACHINE COMPANY
602 Dublin Avenue, Columbus, Ohio

●

Jaeger 1½ Yd. High Speed Unit on Short Wheelbase Ford. Other sizes 1, 2, 3, 4, 5, 6 cu. yds., end or side discharge types.

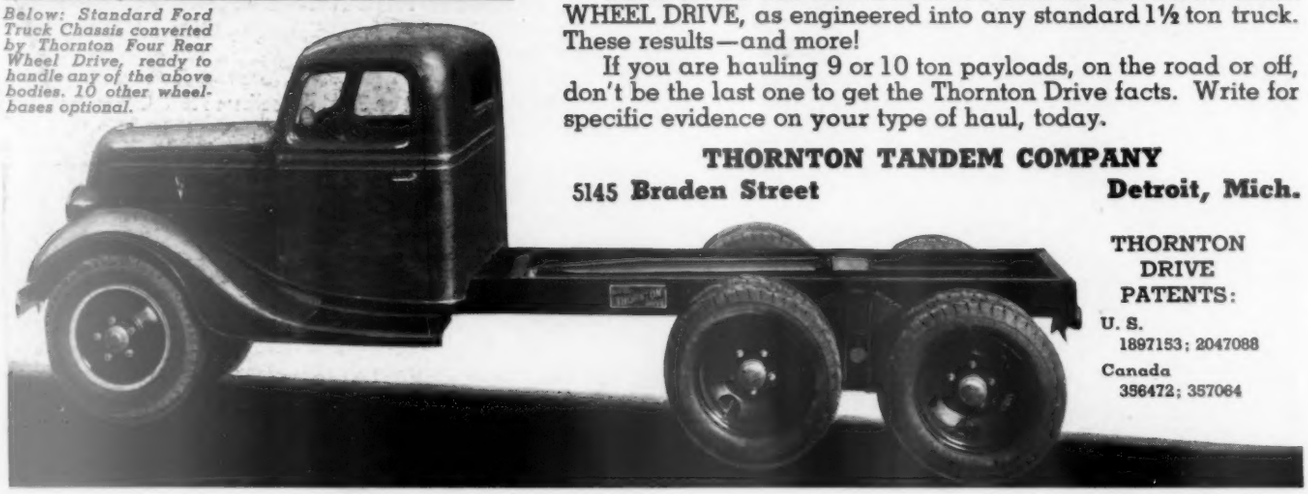
EARTH REMOVAL

QUARRY

BLACK TOP

READY MIX

Below: Standard Ford Truck Chassis converted by Thornton Four Rear Wheel Drive, ready to handle any of the above bodies. 10 other wheelbases optional.



"Boss, I'm Stuck in the Mud"

GO THROUGH with THORNTON
FOUR REAR WHEEL DRIVE!

Lucky indeed is the truck driver whose route has no "tough spot" cursed with mud or sand, or, in season, deep snow or slippery grades. Time lost there can't safely be made up elsewhere in a tight schedule. So why take chances? Why not put sufficient traction and flotation under your loads? Why not, in a pinch, be able to fall back on the powerful rim pull produced by an 87 to 1 ratio creeper gear? And when the load rides safely through the bad spot without a pause, why not have a succession of seven higher speeds to reduce those engine r.p.m's, saving gasoline while making time?

These results are all found in the THORNTON FOUR REAR WHEEL DRIVE, as engineered into any standard 1½ ton truck. These results—and more!

If you are hauling 9 or 10 ton payloads, on the road or off, don't be the last one to get the Thornton Drive facts. Write for specific evidence on your type of haul, today.

THORNTON TANDEM COMPANY

5145 Braden Street **Detroit, Mich.**

THORNTON DRIVE PATENTS:
U. S.
1897153; 2047088
Canada
356472; 357064

BLAW-KNOX TRUKMIXERS and Agitators

ASK THE MEN WHO OWN

Get a Reliable Opinion

Somewhere near you

BLAW-KNOX COMPANY
2080 FARMERS BANK BLDG., PITTSBURGH, PA.

Please advise

1. Where I can see a Blaw-Knox Trukmixer in operation.
2. The name of an owner who will give me an unbiased opinion of Blaw-Knox Trukmixer performance and economy.

Company_____

Individual_____ City_____

Street_____

Plenty of Markets

ED. C. LEVY, INC.
TRUCKING CONTRACTORS
LARGEST FLEET OF DUMP TRUCKS AND DUMP TRAILORS IN MICHIGAN

GENERAL OFFICE
8810 DIX AVENUE
DETROIT, MICH.

April 12, 1937

Calcium Chloride Association
4145 Penobscot Building
Detroit, Michigan

Gentlemen:

It has been proven there are plenty of markets for calcium-chloride stabilized mix.

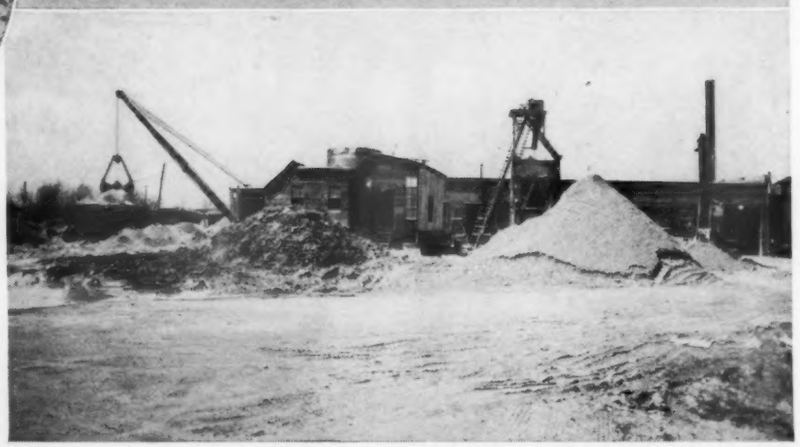
Last year, we turned out 182,000 tons of stabilized mixture -- for city streets and alleys, pavement shoulders, parking areas, golf club walks and steps -- and we didn't begin to touch the market.

Very truly yours,

Edw C Levy

ED. C. LEVY, Inc.

Mr. Edward C. Levy and his stabilized aggregates plant.



for CALCIUM CHLORIDE STABILIZED SOIL MIX

THE TIME HAS COME—THE DEMAND IS HERE

A pioneer in the production of Plant Mix Stabilized Soil, Ed. C. Levy has demonstrated beyond question that plant mixing of aggregates, binder soils and Calcium Chloride opens the greatest market the aggregates producer ever faced.

The tremendous aggregates markets in concrete and the sale of gravel and stone for highway purposes have been the mainstay of pits and quarries. Both, however, have involved much segregation, screening, washing and preparation in many cases exceeding or equivalent to the costs of producing Calcium Chloride Stabilized Soil Mixtures. Fine aggregates and much pit overburden previously removed are desirable ingredients of these scientific, new, balanced soil mixtures. Producers already have much of the needed equipment.

Years of testing have brought nation-wide acceptance of Calcium Chloride stabilized soil as the basis of the great systems of low-cost secondary highways being built. It proves itself to give the most road for the money. It fills a need for a plastic, low-cost material for pavement shoulders, city streets and alleys, tennis courts, parking lots, and other places requiring a firm, durable, dustless and weatherproof surface.

Highway officials find it desirable in many cases to buy stabilized soil mixes rather than to mix on the road or to set up mixing plants. But the demand is here and municipal plants will be built for the purpose unless aggregates producers get into the business and care for the demand.

Bulletin No. 34 tells how. Write for it today.

City Streets

Cemetery and Park Drives

Steps and Walks

Factory and Private Parking Areas

CALCIUM CHLORIDE ASSOCIATION

Solvay Sales Corporation, 40 Rector Street	New York City
The Columbia Alkali Corporation.	Barberton, Ohio
The Dow Chemical Company	Midland, Michigan
Michigan Alkali Company	60 E. 42nd St., New York City

PROFITABLE

Rex GIVES YOU A Year 'Round Market

FOR YOUR SAND, GRAVEL, STONE AND CEMENT

GET STEADY TURNOVER WITH REX MOTO-MIXERS

Cement and aggregate dealers, all over the country, are turning to Rex Modern Mixers and Agitators with the Modern Cone End Drum as the profitable way to merchandise their concrete materials.

Less than a year ago, the Builders and Industrial Supplies, Inc., of Toledo, Ohio, purchased three Rex Moto-Mixers. A little later, owing to the rapid growth of their ready-mixed concrete business, they purchased two more. Now all five of these machines are kept busy in supplying the demand for ready-mixed concrete in and around Toledo.

Rex Moto-Mixers, with their new, lightweight construction, are giving them more and bigger pay loads per day. They are giving lower ton-mile cost—larger daily profit.

Investigate the Rex Way to higher profits in the aggregate and cement industry.

READY-MIXED CONCRETE

Send today for a copy of the book, "Rex Moto-Mixers and Agitators." It describes the modern way to secure the profitable method of selling cement and aggregates. It illustrates the modern features of the Rex Moto-Mixers.

CHAIN BELT COMPANY
1646 W. Bruce St. Milwaukee, Wis.

REX The Up-to-date Method of Handling Concrete

Moto-Mixers

CHAIN BELT COMPANY *of Milwaukee*

MEN of the INDUSTRY

Blackstone Studios Photo

P. G. DAWSON

Shortly after leaving school, in 1913, Mr. Dawson became a bookkeeper for the Newaygo Portland Cement Co. and has been connected with the industry ever since. Rising to chief accountant, he left in 1923 to become assistant secretary of the Manitowoc Portland Cement Co. and in the merger with the Medusa Portland Cement Co. in 1929 he was elected secretary. Last December he was made vice-president, treasurer and a director of the company. He is also an official of the Cement Transit Co. of Michigan, the Potomac Storage Co. of Washington, D. C., the T. R. C. Corp. of Delaware and the T. A. & W. Rwy. of Delaware. Mr. Dawson resides at Lakewood, O., Cleveland suburb, and has a summer home at Newaygo, Mich. His principal recreations are fishing and golf.

Personal Mention

S. E. Hutton, formerly engineer of the Pacific Coast Cement Co., Seattle, Wash., is now director of publicity for the U. S. Reclamation Bureau, specializing on the Grand Coulee Dam. His office is at Coulee Dam, Wash.

E. T. Larson has purchased the Leonard Gravel Co. of Lansing, Mich., changed its name to the Central Michigan Gravel Co. and is now operating the business. Mr. Larson is president of the concern and his general manager is Blake Miller, well known Lansing golf professional.

Herbert L. Oakes, formerly connected with the Kansas state highway department, is now district representative in Kansas and Oklahoma for the Lehigh Portland Cement Co.

Norman L. Park has joined the advertising department of Gulf Oil Company, Pittsburgh, Pa., coming from the Pittsburgh Motor Club, where he was publicity director.

R. F. Dierking has been appointed district engineer at Des Moines, Ia., for the Portland Cement Assn. Mr. Dierking succeeds W. H. Steiner, resigned. W. M. Alsin will serve as Mr. Dierking's assistant.

Howard Herring, Cleveland, O., road contractor, has opened a gravel pit and plant near Willoughby, O., to supply material for a number of construction jobs, including the Central Avenue Housing Project in Cleveland.

Simon P. Bontrager has purchased the plant of the Wolcottville Cement Products Co. at Wolcottville, Ind., and has made a number of important improvements. Building and silo block are being produced.

"Al" Spicer, formerly representing the Tractor & Equipment Co., Chicago, Ill., in Rockford, Ill., and vicinity has been transferred to Peoria, Ill.

Advanced
Designs
•
Bigger
Output
Roll Crusher with Pulsating Feeder gives double capacity. Rib shell construction increases angle of grip and reduces dust.
CIRCLE THROW
Vibrating Screen
Heavy Duty . . . balanced for variation in loads and speeds . . . 100% safety factor in rotary mechanism . . . extension chutes and rubber mounting are standard . . . capacities up to 100 tons per hour. Ask for Bulletins on Screens, Crushers, Portable and Stationary Conveyors.
NEW HOLLAND
MACHINE COMPANY
New Holland, Pa.

Robert Kilgore of Anderson, Ind., who has been connected with the Alexandria, Ind., plant of the General Insulating & Mfg. Co., has moved to Dover, N. J., where he will manage the new mineral-wool plant of the company.

D. J. Henecker has been appointed manager of the wire-rope sales department of the Wickwire Spencer Steel Co., succeeding R. H. Cherry, deceased. Mr. Henecker, who is 39, has had an unusually wide and varied career in the sales and promotion of wire rope and steel products.

Don McCormick has been named arc-welding consultant for the Kansas City office of the Lincoln Electric Co.

Paul C. Nordloh has been appointed as advertising manager of the Cleveland Tractor Co. For the past three years he was with Deere & Co., Moline, Ill., where he was responsible for a large part of the advertising and sales-promotional material used on John Deere tractors. Previously he was for nine years with Procter & Collier, advertising agency, Cincinnati.

Harlowe Hardinge, vice-president and general manager, Hardinge Co., Inc., York, Pa., has departed on a trip to the west coast. He will stop on his way back at the Hardinge offices in Denver and Chicago.

Charles Abeles has recently joined the sales organization of the Easton Car & Construction Co., Easton, Pa. Mr. Abeles is making his headquarters at the New York office of the company. He was formerly with the Koppel Industrial Car & Equipment Co.

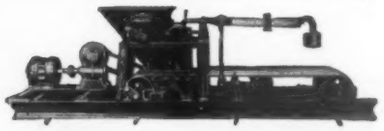
Erwin A. Wendell has been named district sales manager of the Link-Belt Co., with headquarters at 317 N. 11th St., St. Louis, Mo. Mr. Wendell has been with Link-Belt in Chicago since 1918, and for a number of years served as sales engineer in metropolitan Chicago.

W. G. Heacock, who joined the Air-Maze Corp. in 1928, has been appointed Michigan factory representative of the company. He will make his headquarters at the offices of the Barton D. Wood Co., Inc., at Detroit.

Charles Uthe has joined the engineering staff of the Parsons Engineering Corp., Cleveland, O. He will specialize in the design and development of dust-control equipment for the cement industry.

MATERIAL weighed and proportioned with

99% Accuracy



Weighing and proportioning material with 99% accuracy, Schaffer Poidometers are recognized throughout the cement industry as important equipment in modern plant control.

Schaffer Poidometers are automatic in action and will operate continuously or, with a mechanical weighmaster attachment, will provide batch operation.

This efficient weighing equipment is now saving thousands of dollars throughout the cement industry. Many leading plants are now saving money while obtaining greater efficiency with Schaffer Poidometers. Let us help solve your proportioning and feeding problems. *Write for catalog No. 5.*

SCHAFFER POIDOMETER COMPANY
2828 Smallman Street **Pittsburgh, Pa.**

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L. W. KNAPP has been appointed to the sales engineering staff at New York by Oliver United Filters, Inc. He was formerly with the Oliver Continuous Filter Co. and more recently with the Taintor Co.

H. J. STANNERT, president and general manager of the West Branch Sand & Gravel Co., Williamsport, Pa., passed away a short time ago. Death was due to heart disease. He had been engaged in the production and marketing of aggregates since 1918.

DAVID HYMAN, well-known sand-and-gravel producer of Buffalo, N. Y., died a few weeks ago in California. He was 77 years old. Formerly president of the Buffalo Gravel Corp., Mr. Hyman at his death was vice-president of the Empire Limestone Co.

ORSON W. KNIGHT, 71, president of the River Sand Co. of Topeka, Kan., died recently. He had been in the sand business ever since 1910 when he purchased the Topeka Sand Co., which he operated in 1918. Since 1920 he had been head of the Topeka Sand Co.

HENRY G. MILLIGAN, 73, an employee of the Wabash Sand & Gravel Co., Terre Haute, Ind., died recently of suffocation when he was buried under a slide of sand at the company's pit.

WALTER B. BROOKS, JR., president of the Arundel-Brooks Concrete Corp., Baltimore, Md., died recently at the age of 52, in a Baltimore hospital.

TRADE NOTES

Manufacturing facilities of the Whitnall Conveyor & Mfg. Co., Whitewater, Wis., have recently been expanded. The Whitnall line of conveyors, unloaders and material-handling equipment has been redesigned, extensive use being made of pressed steel in its assembly.

The Dust Control Equipment Assn. at its recent meeting selected officers as follows: President, H. B. Loxterman, Blaw-Knox Co., Pittsburgh; vice-president, M. A. Eiben, Northern Blower Co., Cleveland; executive secretary-treasurer, Arthur J. Tuscany, Cleveland. The offices of the Association are located in the Penton Bldg., Cleveland, O.

The George Haiss Mfg. Co., New York, N. Y., has appointed the following distributors: Smith-Booth-Usher Co., Los Angeles, Cal.; H. W. Moore Equipment Co., Denver, Colo.; and West Virginia Tractor & Equip. Co., Charleston, W. Va.

Arnold & Weigel, Inc., lime plant engineers and contractors, Woodville, O., have recently opened a New York office at 154 Nassau St. John H. Barker is in charge.

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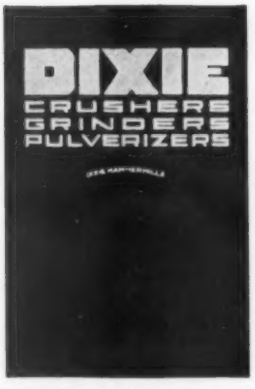

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Foreign Developments

Study of Minerals in Cement Mixture

Although the behavior of the individual mineral components of a mixture such as Portland cement do not directly indicate the behavior of the mixture itself, much interesting basic information is obtained by a study of the individual minerals. Such studies on the aluminates and silicates of lime are reported by P. Schlaepfer in the 24th annual report of the Association of Swiss Cement, Lime and Gypsum Manufacturers. In a study of the set of tricalcium silicate, microscopic observations showed how the tricalcium silicate particle in the presence of water is surrounded by an increasing coating of gel, so that the speed of the hydration decreases as the thickness of this coating increases. While the gel-like mass, probably dicalcium silicate hydrate, shows little tendency to crystallization, large crystals of calcium hydroxide form under favorable condition, and were so found by Schlaepfer. Further information on the hydration process was yielded by means of the determination of the free lime by the glycolate process, taking the amount of free lime as an indicator of the progress of hydration; hydration was not appreciably accelerated by increasing the quantity of gaging water or by water storage.

Among the results of the strength tests, the high flexural strength of the tricalcium silicate was of special interest. In the leaching tests for the study of the effect of exposure to water it was shown that combined lime as well as free lime is gradually dissolved out.

In studies on mixtures of the minerals it was found that the addition of aluminate considerably accelerated the initial set, verifying the findings of Forsen. Dicalcium silicate had a very sluggish hardening reaction, free lime appearing in appreciable amount only after 117 days storage. The addition of monocalcium aluminate appears to accelerate the hydration.

Investigations of monocalcium aluminate yielded the interesting result that this compound can be destroyed by storage under water. The explanation of the mechanism of the reaction could not be given, but it is apparent that the silicate and ferrite constituents of alumina cement mortar are of considerable importance for its hardening and durability.—*Tonindustrie-Zeitung*, 61-4-5, January 4, 1937.

Waterproofing Cement and Concrete Works

A distinction should be drawn between apparent or relative water-tightness and absolute water-tightness; the first is sufficient for the greater part of civil-engineering works in concrete (hydraulic works, reservoirs, canals), while the second should be effected for waterproofing basements, roofs, terraces, and the copings of bridges. It is relatively easy to make concretes or cement coatings with a high relative water-tightness, but these will never be perfectly water-tight; this quality can only be given them by a special surfacing or coating.

The addition to the cement of substances intended to make the whole mass impermeable is, in general, costly. It does not effect absolute water-tightness, but very considerably improves the relative water-tightness and facilitates the correct handling (workability) of the concrete. The artificial closing of the pores of concrete is economical, but its effect is not very lasting on account of the extreme thinness of the impermeable layer achieved, which is exposed to destruction or damage by mechanical actions, settling, and shrinkage cracks. Cement coatings make it possible to remedy local faults and they improve the appearance of the facing, but they lack elasticity and are subject to fissuring under the action of settling and shrinkage; they give a relative water-tightness, but not absolute water-tightness. The latter can only be achieved in a lasting manner with coatings several centimeters in thickness, of asphalt or tar base, sometimes with a thin sheet of metal (aluminum) or of bitumened-paper inserted.

The method of waterproofing should be chosen in every particular case in consideration of the special conditions of the job: the degree of water-tightness desired, the variations of temperature and of dampness, the mechanical and chemical actions, the possibilities of cracking or fissuring of the work as a result of settling, shrinkage, and the like.—J. Bolomey in *Revue des Materiaux de Construction et de Travaux Publics*, No. 330, pp. 54-57, March, 1937.

CHEAP CRUSHER POWER HERE!
Kanawha Sand Company, at Parkersburg, W. Va., obtain a lot of convenient, reliable and yet mighty cheap power for their crusher and screens. Mr. C. Z. Ruth, President, and Mr. A. A. Barringer, Engineer, selected a Cooper-Bessemer, 325 H. P., Diesel Electric Set as their source of low-cost power...and profit! Investigate Cooper-Bessemer Diesel and Gas Engines...economy champions!
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Hydraulic Lime in Trajan's Bridge

Although we are accustomed to think of lime-pozzuolana mixtures as the cement of the Romans, an old Roman water conduit in the Eifel mountains examined a few years ago by Professor Grün (*Tonindustrie-Zeitung*, 1935, No. 31, p. 400) was constructed with hydraulic lime. Similarly, two samples of concrete from the famous Trajan's Bridge across the Danube at the village of Turn-Severin were found by S. Solacolu (*Bull. de Math. et de Phys.*, Bucharest, 1934-35, No. 1, 2, 3) to be constructed of a strongly hydraulic lime in the nature of Roman cement. In microscopic examination it was observed that along with the amorphous, gel-like mass there were crystalline particles of uncombined cement particles; also, evidence was found of "etching" of the surface of the quartz-sand particles, indicating a slight reaction actually between the binder and the quartz-sand particles. The gradation of the aggregates was studied and charted; for segregating the aggregates Solacolu used the interesting method of heating the concrete to dehydrate the binder and destroy the concrete, after which the binder and the aggregates were separated by washing with water and dilute hydrochloric acid. The mix ratio was found to be, in the case of a specimen using sand as fine aggregate and broken brick as coarse aggregate, 1:2.1:2.6. The compressive strength was 305 kg. per sq.cm., which would probably have been higher if a harder coarse aggregate had been used; the binder was definitely stronger than the aggregate.—*Tonindustrie-Zeitung* 61:176-177, Feb. 22, 1937.

Colloid Hardening of Lime Mortar

On the basis of the author's observations on the hardening of lime mortar (*Tonindustrie-Zeitung*, 1936, p. 97), the author had formed the working hypothesis that the hardening of lime mortar is to be ascribed primarily to the colloid hardening of calcium hydrate conceived as a gel, and that the carbon-dioxide action played only a secondary *rôle;* many phenomena not otherwise clear appeared to be made intelligible by this hypothesis. This hypothesis has been attacked by Dawihl-Flüshöh-May (*Tonindustrie-Zeitung*, 1936, p. 761) on the ground of Roentgenographic studies revealing crystalline bodies but no material with a capacity of swelling, and thus no gel, in a fine-grained lime hydrate obtained by the hydration of quicklime with excess water. The data of Dawihl-Flüshöh-May are examined critically, in relation to numerous other published studies, and the author concludes that they considerably restrict, if they do not altogether eliminate, his working hypothesis, no matter how well it appeared to explain some of the phenomena of the hardening of lime mortar.

Nevertheless, Dawihl's conclusion that 95 per cent. of the water is essentially mechanically bound in the interstices between the individual particles and that the remaining 5 per cent. is more solidly combined on the surface of the particles as water envelop is criticized on several considerations. We remain to-day still far away from an explanation of the hardening of lime mortar; a further problem for research is to bridge the conflicting data and to determine whether and to what extent any colloid is present in and plays a part in the process. Prof. I. R. V. Rodt in *Tonindustrie-Zeitung* 61: 147-148, 156-157, 168-169, Feb. 11, 15 and 18, 1937.

Requirements of Stone for Road Building

The "requirements of stone aggregates in modern road building and in concrete production" are discussed in a paper by Dr. W. Heim published in *Steinindustrie und Steinstrassenbau* 32: 38-41, 56-59, Feb. 4 and 18, 1937. The requirements are classified and discussed under the heads of (1) requirements as to particle size and gradation or screening, (2) requirements as to particle shape, and (3) requirements as to cleanliness. In each instance the scientific requirements and the demands of purchasers are discussed in relation to both the theoretical and the practical possibilities of the stone plants to produce the required material.

Coming Events

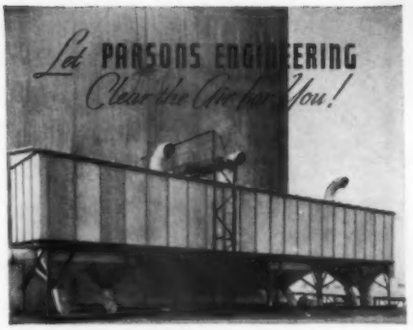
May 11-12, 1937, Chicago, Ill.—Annual convention, National Lime Assn., Drake Hotel.

May 18-19, 1937, Washington, D. C.—Second annual convention, National Industrial Sand Assn., Hotel Raleigh.

May 26-28, 1937, Washington, D. C.—Annual May meeting, American Road Builders' Assn., Willard Hotel.

June 24-25, 1937, Buffalo, N. Y.—Meeting, board of directors, National Sand & Gravel Assn., Hotel Statler.

June 28-July 2, 1937, New York, N. Y.—Fortieth annual meeting and exhibit, American Society for Testing Materials. Waldorf-Astoria Hotel.



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Traffic News Digest

Legislation

Fourth Section Revision — The Pettengill Bill repealing the long-and-short-haul clause of the fourth section was passed by the House on April 14 by a vote of 268 to 120. The bill now goes to the Senate where it will be considered by the Senate Interstate Commerce Committee who will hold hearings on the bill and if the Committee is favorably disposed it will be brought before the Senate for further discussion and a vote. Several unsuccessful attempts were made to amend the bill in the House; one amendment proposed to change only the present law by eliminating the equidistant clause. The bill passed the House in the last Congress and hearings were started in the Interstate Commerce Committee of the Senate but were not completed when Congress adjourned. One obstacle which is of considerable importance is the opposition of Sen. Wheeler of Montana to this legislation. Sen. Wheeler is chairman of the Senate Interstate Commerce Committee.

Government Ownership—A bill introduced in the House of Representatives by Rep. Dunn of Pennsylvania would provide for government ownership of the railroads and other utilities. The purpose of the bill is to provide employment and to end poverty in the United States. It provides for the expenditure of 30 billion dollars for a number of things beside government ownership of railroads and utilities including prevention of floods, forest fires, dust storms, soil erosion, purification of rivers and streams, slum clearance, constructing of homes, schools, hospitals, roads, bridges, reservoirs, canals, tunnels, subways and disposal plants and in addition to a number of other things mentioned, provides for the use of the money for every other purpose which will solve the unemployment problem and promote the welfare of the people of our country with the further provision that no one working for a government enterprise should work more than 30 hours a week or be paid less than 75 c. per hour. This bill is HR 5,811.

Rail Pensions—While the railroads and representatives of railroad labor organizations have agreed on a rail pension legislation that would provide for a tax of 2½ per cent. to be levied against the railroads on their payroll with a light tax to be deducted from the employee's pay check there is some question as to whether the Treasury Department will agree that this tax will be sufficient to carry out the pension provisions of the plan.

Train Dispatchers—In the hearing before the house committee on Interstate and Foreign Commerce on HR 208, a bill designed to regulate train dispatching, it was brought out by proponents of the bill that while the number of freight train and passenger train miles has been increasing, the number of train dispatchers has been decreasing. This bill would allow the Interstate Commerce Commission to regulate the working conditions of train dispatchers and is sponsored by the American Train Dispatchers Assn. and the Railway Labor Executive Assn. In opposing the bill the railroads claimed that it could not be justified as a safety measure.

Recent I. C. C. Decisions

Crushed Stone—The Commission has found that the applicable rate on crushed stone from Marquette, Mo., to Leechville, Ark., of $1.10 plus a 7-per cent. emergency charge was not unreasonable and has refused to approve a waiver of the collection of an outstanding undercharge of $468.67 due to charges having been collected on a 90 c. rate. The complaint has been dismissed in I. C. C. Docket No. 27,489, D. F. Jones Construction Co. *v.* St. L. S. W. *et al.*

Gravel—In a complaint involving the rate on gravel from Riverton, Ind., to Bethel, Ill., the Commission has found that the rate of 88 c. which was charged on shipments made between October 25 and November 7, 1935, expired on September 20, 1935, and that the applicable rate was 95 c. and that this rate was not shown to be unreasonable. The complaint has been dismissed. I. C. C. Docket No. 27,551, Merom Gravel Co. *v.* Illinois Central.

Sand—The rate on common sand from Massillon, O., to Wampum, Pa., of $1.15 a net ton effective between September 7, 1934, and August 25, 1935, has been found unreasonable to the extent it exceeded $1.00 a ton without the emergency charge in I. C. C. Docket No. 27,496, Federal-American Cement Tile Co. *v.* Pennsylvania.

In a further hearing the Commission was asked to amend the original report in 210 I. C. C. 629, in which the Commission found the rates on sand to Philadelphia, Pa., from interstate points were prejudiced by intrastate rates. In this further hearing it was found that this prejudice had been removed but that the carriers were confronted in the Philadelphia area with competition from truck and water traffic. Complainants sought a revision of rates which would meet this competition similar to the revisions made in the Chicago area in 118 I. C. C. 633 and similar to those made on crushed stone and the Cleveland and Toledo areas in 191 I. C. C. 206. The Commission said that such action would not be warranted on the evidence presented at this hearing. I. C. C. Docket No. 26,596, Norcross Bros. *v.* Pennsylvania.

Some corrections have been made as to the amounts of reparation to be paid complainants or interveners in I. C. C. Docket No. 22,907, Industrial Sand Cases, 1930. Details will be furnished on request.

Sand, Gravel and Slag—The Commission has found the proposed changes in the rates on sand, gravel, slag and related articles from points in Alabama to destinations in the Florida Peninsula have not been justified and has ordered the suspended schedules cancelled and the proceeding discontinued. The carriers claim that the rates which they propose to amend and which had been made effective Aug. 18, 1928, were established in error and that proper mileages were not used. The Commission found that the proposed rates would be unreasonable. I. & S. Docket No. 4,245 sand, gravel and slag from Alabama to Florida.

Examiners' Reports

Agricultural Limestone—Examiner John J. McChord proposes that the Commission find the rates on agricultural limestone from Gibsonburg and Woodville, O., to destinations in New York, Pennsylvania, West Virginia and Indiana, in C.F.A. territory unreasonable to the extent they exceeded or may exceed rates based on a scale shown in Appendix A of the report and as found in National Mortar & Supply Co. of Ann Arbor, 152 I. C. C. 429, 191 I. C. C. 188 and 208 I. C. C. 119. The scale provides rates for both open top and box cars and a differential for single line hauls for distances of less than 125 miles.

For destinations in Pennsylvania and West Virginia in trunk line territory the Examiner proposes the use of the mileage scale to Pittsburgh-plus the usual prescribed arbitraries for trunk line haul. He proposes that new rates be prescribed and that reparation be awarded. I. C. C. Docket No. 27,472, National Mortar and Supply Co. *et al v.* Pennsylvania *et al* and sub-number 1, Same *v.* Same; sub-number 2, Ohio Hydrate & Supply Co. *v.* Pennsylvania *et al* and sub-number 3, Same *v.* Same.

Sand—In a number of cases involving the rates on industrial sand between points in official territory prior to June 1, 1935, Examiner Burton Fuller proposes that some rates be found unreasonable and others not unreasonable and proposes an award of reparation in some cases. As these all involve rates in effect prior to July 1, 1935, details of his proposals in the various cases involved are not printed here but will be furnished on request. Docket numbers covered by this report are Nos. 27,436, 27,481 and Sub 1, 27,503, 27,505, 27,506, 27,509, 27,513 and Sub 1, 27,520, 27,531, 27,541, 27,554, 27,568, 27,576, 27,592 and Sub Nos. 1 to 5 inclusive. Reparation is proposed in all except Nos. 27,505, 27,513 and Sub 1, and 27,592 Sub 4.

Sand and Gravel—Examiner Carl A. Schlager recommends that the Commission find the applicable rate of 95 c. on sand and gravel from Hawarden, Iowa, to Waterbury, Neb., on shipments made during April and May, 1935, to the extent they exceeded 85 c. a ton. The 85 c. rate was collected and the Examiner said defendants should be authorized to waive collection of the outstanding under charges. I. C. C. Docket No. 27,599 Booth & Olson, Inc. *v.* C. B. & Q. *et al.*

Motor-Carrier Charges — Examiner Paul Coyle in a general investigation of credit and collection rules of the various motor carriers has found a wide difference in the credit period

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extended by various carriers. This case involved an investigation instituted by the Commission on its own motion in order to determine what rules and regulations it should prescribe to govern the settlement of rates and charges. Section 228 of the Motor Carrier Act provides that rules and regulations for the collection of charges may be prescribed by the Commission. Examiner Coyle recommends the following five rules:

1. Upon taking precautions deemed by them to be sufficient to assure payment of the tariff charges within the credit period herein specified, common carriers by motor vehicle may relinquish possession of freight in advance of the payment of the tariff charges thereon and may extend credit in the amount of such charges to those who undertake to pay them, such persons herein being called shippers, for a period of eight days, excluding Sundays and legal holidays other than Saturday half-holidays. When the freight bill covering a shipment is presented to the shipper on or before the date of delivery, the credit period shall run from the first 12 o'clock midnight following delivery of the freight. When the freight bill is not presented to the shipper on or before the date of delivery, the credit period shall run from the first 12 o'clock midnight following the presentation of the freight bill.

2. Where a common carrier by motor vehicle has relinquished possession of freight and collected the amount of tariff charges represented in a freight bill presented by it as the total amount of such charges, and another freight bill for additional charges is thereafter presented to the shipper, the carrier may extend credit in the amount of such additional charges for a period of 30 calendar days to be computed from the first 12 o'clock midnight following the presentation of the subsequently presented freight bill.

3. Freight bills for all transportation charges shall be presented to the shippers within five calendar days from the first 12 o'clock midnight following delivery of the freight.

4. Shippers may elect to have their freight bills presented by means of the United States mails, and when the mail service is so used the time of mailing by the carrier shall be deemed to be the time of presentation of the bills. In case of dispute as to the time of mailing the postmark shall be accepted as showing such time.

5. The mailing by the shipper of valid checks, drafts, or money orders, which are satisfactory to the carrier, in payment of freight charges within the credit period allowed such shipper may be deemed to be the collection of the tariff charges within the credit period for the purposes of these rules. In case of dispute as to the time of mailing the postmark shall be accepted as showing such time.

Traffic News

Emergency-Charge Hearings—In presenting testimony against the proposed increase in the rates on coal, C. R. MacCarey, witness for the Portland Cement Manufacturers of Pennsylvania, testified that, in 1927, the cement manufacturers whom he reported used 9,990,531 tons of coal and that in 1926 they used only 4,772,827 tons. During the same period the use of natural gas rose from 23,640,250,515 cu.ft. to 36,928,254,739 cu.ft. He stated that competition from foreign cement would make it impossible for manufacturers in the Lehigh district to pass along the increase in the cost of coal on shipments of cement to destinations in New England and New York.

Lauson S. Stone speaking for the Jones & Laughlin Steel Corp. protested any increase in the rates on coal, coke and limestone. He said the proposed increase on fluxing stone would cost his company $69,646.00 a year.

Opposition to an increase in the rates on agricultural lime and agricultural limestone was made by T. D. Geoghegan who reported the Corporation Commission of Virginia.

J. F. Potts, traffic manager of the Kelley Island Lime & Transport Co. of Cleveland, O., representing lime producers in Ohio, Illinois, Pennsylvania and New York, in opposing increases in the rates on lime, said that the increasing volume of traffic on the railroads would supply their needs for more money and called attention to the fact that a large volume of lime tonnage was handled by motor trucks and that an increase in the rates on lime would drive more tonnage to the trucks thereby depriving the rail carriers of this revenue.

On April 5 W. N. Davis presented a list of commodities with proposed rate increases for addition to Part 2, exhibit "A" which the tariff publishing agent had inadvertently omitted from the list. This list includes the following commodities and commodity rate increases: Crushed rock—1 c. per 100 lb. The following commodities included in the list are to take a proposed increase of 10 per cent. with a maximum of 5 c. per 100 lb.—sand, slag, crushed slate, crushed talc, crushed mica, soapstone, pumice, talc, limestone and marble waste. Natural and artificial stone are to take an increase of 10 per cent. with a maximum of 2 c. per 100 lb.

Personal News—E. R. Gustafson, assistant traffic manager, Universal Atlas Cement Co., has been elected third vice-president of the Traffic Club of Chicago.

J. F. Potts, traffic manager, Kelley Island Lime & Transport Co. and president of the Cleveland Traffic Club has been elected to represent his club at the annual meeting of the Associated Traffic Clubs of America. He was one of a group of traffic club presidents who recently flew to Chicago to attend a meeting of the Chicago Traffic Club devoted to the subject of air transportation.

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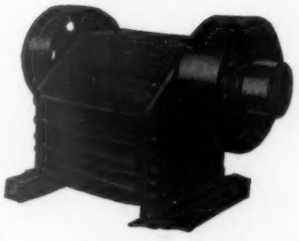

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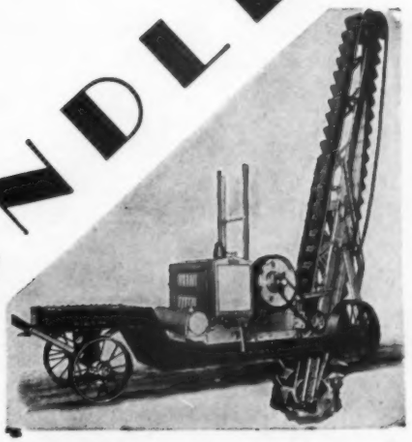

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Occupational Diseases and the Law

Pieczonka, as Administratrix, v. Pullman Co., decided on April 5, 1937, by the United States Circuit Court of Appeals, Second Circuit (New York case). This is an action to recover for death due to silicosis, the deceased having been employed as a sandblaster working either in a yard in the open air or under a shed without sides. The appellate court sustains the trial court's ruling that neither Sec. 299 (2) of the New York Labor Law nor the State Industrial Board Rule 741 thereunder required the defendant to install suction devices, and that the case was correctly left to the jury on common-law principles. However, the trial judge instructed the jury that if the deceased had contracted silicosis before July 5, 1929 (the deceased having begun an action on July 5, 1932), the plaintiff could not recover. The appellate court holds that the fact that the deceased could not have recovered if he had left the defendant's employ on or before July 4, 1929, did not affect his right to recover at least for the period between July 5, 1929, and the time he left the defendant's employ, or for any aggravation of his malady, even though already contracted; and that the plaintiff in this suit had a right of action to recover for any loss due to his death, even though his lungs had been so far invaded on July 5, 1929, that he would have died of silicosis anyway. However, the measure of damages would be the plaintiff's loss over the period by which the deceased's life was shortened on account of his exposure after July 5, 1929. The judgment for the defendant in the lower court was reversed and a new trial ordered.

Gentry v. Swann Chemical Co., decided April 8, 1937, by the Alabama Supreme Court. This suit grew out of phosphate poisoning, it being alleged that the plaintiff was required to work in a room which was not ventilated, with the windows closed, and the room filled with fumes, dust and small particles of the tri-sodium phosphate mixture which was produced and refined. The averments of the complaint removed the case from the influence of the Alabama Workman's Compensation Act, and the defendant's demurrer that the plaintiff's alleged disability is the result of "occupational disease," for which the employer is not liable either under the common law or the Employer's Liability Act was sustained by the trial court. The Supreme Court overrules the trial court and remands the case, holding that the rule of common law upon which the defendant depended is restricted to disease resulting from the ordinary and generally-known risk incident to the particular employment and long-continued work therein; that it does not apply to a disease resulting from the tort of the employer, such as neglect to furnish a safe place to work; and that it was not the legislative intent by enactment of the Workman's Compensation Act, in the case of an injury not within the act, to deny the injured person a remedy, if under the common law or the Employer's Liability Act or other statute he was entitled to maintain an action therefor.

Maty v. Grasselli Chemical Co., decided April 2, 1937, by the United States Circuit Court of Appeals, Third Circuit (New Jersey case). This decision affirms (although on different grounds) judgment in the lower court denying plaintiff recovery in a suit based upon injuries alleged to have been sustained while employed in defendant's chemical factory. In the original bill, filed October 1, 1935, plaintiff alleged injuries resulting from employment in the silicate department, and that defendant had failed to provide adequate safety standards and proper ventilation. Inasmuch as plaintiff was transferred to the defendant's phosphate department in 1932, the action based upon negligence in the silicate department is held to be outlawed by the New Jersey two-year limitation period. It is also held that the trial judge erred in permitting amendment of the complaint to include injuries sustained in, and negligence in the conduct of, the phosphate department, as the negligence alleged in such amendment involved a different act, and different buildings, departments, conditions and dates of exposure.

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Portland—914 N. W. 14th Ave.
Seattle—2244 First Ave. So.

Round Strand
•
Flattened Strand "P. F. S."
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Non-Rotating
•
Preformed
•
Steel Clad
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Locked Coil
•
Regular Lay
•
Lang's Lay
•
Hemp Center
•
Wire Rope Center
•
Metallic Core
•
Seale-Filler Wire
Warrington

TRADE NOTES

The Patterson Foundry & Machine Company of East Liverpool, O., has announced the opening of its Pittsburgh office. This office is located in the Bessemer Building and D. M. Wilhelm is in charge.

TRADE NOTES

American Chain & Cable Co., Inc., is the new name of an old company, known previously as American Chain Co., Inc. Long recognized as the world's largest manufacturer of chains for all purposes, the American Chain Co. has since 1924 become a leader also in the production of wire rope for all purposes. It was this fact which caused the directors of the corporation to enlarge the name.

The Worthington Co., Inc., with offices in Seattle, San Francisco, Los Angeles and El Paso, has been absorbed by its parent organization, Worthington Pump & Machinery Corp., Harrison, N. J.

The National-Superior Co., Toledo, O., maker of Diesel engines and other machinery and equipment for the mining and petroleum industries has changed its name to the National Supply Co.

New Publications

ENGINEERING EXPERIMENT STATION BULLETIN No. 23, *Virginia Polytechnic Institute, Blacksburg, Va. 54 p.*

The report of an investigation on the effect of various types of storage on the particle size and mineralogical content of two Virginia limes. Masons' hydrated lime and hydraulic lime, obtained from the Riverton Lime Co., Riverton, Va., were used.

THE MINING INDUSTRY OF IDAHO, 1936, *by Arthur Campbell, Inspector of Mines, Boise, Ida. 315 p.*

A report, comprehensive in character, covering the progress of the metallic and nonmetallic-mining industries during the past year. Mineral resources of the state are covered and the capital structures of the companies operating in the state are given.

NONMETALLIC MINERAL RESOURCES OF NEW MEXICO, *by Sterling B. Talmadge and Thomas P. Wootton. Published by the New Mexico School of Mines, Socorro, N. M. 160 p. Price $.50.*

The geology and occurrence of the various nonmetallic minerals with the exception of fuels are well covered in this bulletin. Although most of the common minerals exist in New Mexico there has been comparatively little development, excepting in potash, due to the absence of local demand and the long distance to most of the markets. Until that distant day when other supplies are exhausted, many of the state's deposits will probably remain unworked awaiting higher prices, cheaper transportation and an increased demand.

THE STONE INDUSTRIES, *by Oliver Bowles. Published by McGraw-Hill Book Co., Inc., New York, N. Y. 519 p. Price $5.00.*

The author, who is supervising engineer of the building-materials section of the United States Bureau of Mines, is one of the best-informed authorities in the field of nonmetallic minerals. The subject is divided into three parts, (1) a discussion of the general features of the industries, (2) dimension stone, and (3) crushed and broken stone. The geology, technology, distribution and utilization of the material are well covered and an analysis of the industries by states is interesting and informative.

Plat-O Screens stand close inspection

The Plat-O Screen **overcomes blinding** more successfully than other types of heavy duty vibrating screens because **it operates at higher speeds.** This high speed in the Plat-O is made possible by the fact that the weight of its rugged vibrating frame is not carried on the shaft of its vibrating mechanism. This is one of the twelve important points to consider in the selection of screening equipment, because high speed vibration insures maximum recovery and sustained high capacity.

1. **Extra rugged construction**
2. **Free from bearing trouble**
3. **Adjustable vibration or throw**
4. **HIGH SPEED ELIMINATES BLINDING**
5. **Spring mounted, no vibration to supporting structure.**
6. **Oil lubrication, no grease**
7. **Combined sifting and vibrating action means high capacity**
8. **Ideal for medium or coarse screening**
9. **Flat screening angle and minimum headroom**
10. **Long screen cloth life, no whipping**
11. **Screen Cloths easily changed**
12. **No eccentrics, fewer bearings and fewer repairs.**

Watch for additional "Pointers for Screen Buyers" in the coming months—and be sure you have all of the super-features of Plat-O Screens in your equipment.

DEISTER MACHINE CO.

1933 E. Wayne Street **Fort Wayne, Indiana**

Emil Deister, Sr., Pres.; I. F. Deister, V. Pres.
Emil Deister, Jr., Secy.-Treas.

New Machinery and Supplies

Conical Mill Has New Type Grate and Discharge

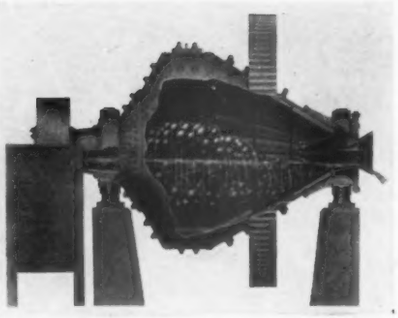
The Hardinge Co., York, Pa., announces the reverse-cone grate and high pulp-level discharge, a new development in mill design that simplifies construction and increases overall efficiency.

Formerly, standard construction of the mill for wet-grinding purposes incorporated an outward-facing ball-retainer grate and trunnion opening the same size as the inside diameter of the open discharge trunnion. By reversing the grate, as shown in the picture, so it faces inward, and by increasing the pulp level by use of a much smaller pulp level discharge spout, or bell, the old pulp level within the mill is raised considerably. The action of the reverse cone grate keeps the small balls or tramp oversize within the mill. In fact, when balls or tramp oversize crowd into the apex of the cone, this crowding tends to raise the mass on the top of the grate, and it falls back into the mill, thus keeping the grate absolutely free. As the grate is at the discharge end of the mill, where there is no cascading action, wear is negligible.

Raising the pulp level increased the overall capacity 8 to 9 per cent. over previous operations, with power remaining constant. Ball and liner wear figured on a basis of cost per ton is correspondingly reduced.

The high pulp-level discharge is much easier to close circuit with the standard classifier, without having to employ excessive sizes and diameters of scoops. The cone grate and high pulp-level discharge is so designed that it may be incorporated on all standard modern type Hardinge mills, now in use, and the device is part of standard equipment on all new Hardinge mills for wet grinding.

The change in design, small though it is, results in an important increase in capacity and efficiency. In fact, this one improvement marks the biggest single advance in the mill operation in the last fifteen years, insofar as wet grinding is concerned.



Cut-away view of the improved mill.

100% EFFICIENCY

in New Method of Resharpening Bits

Get 100 per cent efficiency from our new, perfected method of resharpening bits, and save enough to justify shipment from any part of the country. Here is what our process does for you at a small fraction of the cost of buying new bits.

Each bit is normalized to take out strains in the steel from previous drilling. It is machined to its original cutting edge and clearance angle, one size smaller in gauge. The bit is hardened by reheating in a Pyrometer-controlled furnace, thereby eliminating guesswork, then it is coated with adhesive oil to prevent rusting and packed in a box marked for size and make.

FREE OFFER: Send us a few of your worn bits. We will recondition and resharpen them and return them to you, good as new, without cost or obligation.

ROCK BIT SALES & SERVICE, INC.

2514 East Cumberland St., Philadelphia, Pa.

Announces Improvements in Long-Mesh Woven-Wire Screen

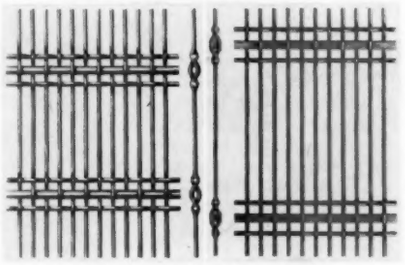
The Ludlow-Saylor Wire Co. of St. Louis has announced a further improvement in the weave of its newly-developed Sta-Tru long-mesh woven-wire screen.

The Sta-Tru screen was developed with a straight stay-rod woven into the transverse members of the fabric to eliminate the fault, inherent in ordinary crimped wire screens, of stretching under the tension applied by many vibratory screening machines.

Excessive tension applied to the lighter grades of woven-wire screens heretofore available for the decks of vibrating screens has all too frequently resulted in stretching of the crimps in the wires, permitting the openings to spread, and often causing the screen to split due to breaking of the wires in the stretched crimps.

Ordinary types of weave often set up certain crimping strains in the molecular structure of the crimped wires, and these strains may be further intensified by the powerful vibrations to which the screens are submitted in service. Naturally, therefore, many crimped wires have insufficient tensile strength after crimping to carry the added burden of excessive stretching tension.

The new improved Sta-Tru type of oval-stay-bar weave has relieved the wires of crimping strains, so that vibration has no destructive effects on the structure of the metal in the wires. The tensioning members of the screening equipment, moreover, exert their pull exclusively on the straight, uncrimped oval-section stay-bars of high tensile strength, which are woven into the screen in combination with the crimped transverse wires. This construction maintains the longitudinal screening wires in their proper relationship and uniform spacing throughout the extended life of the Sta-Tru screen.



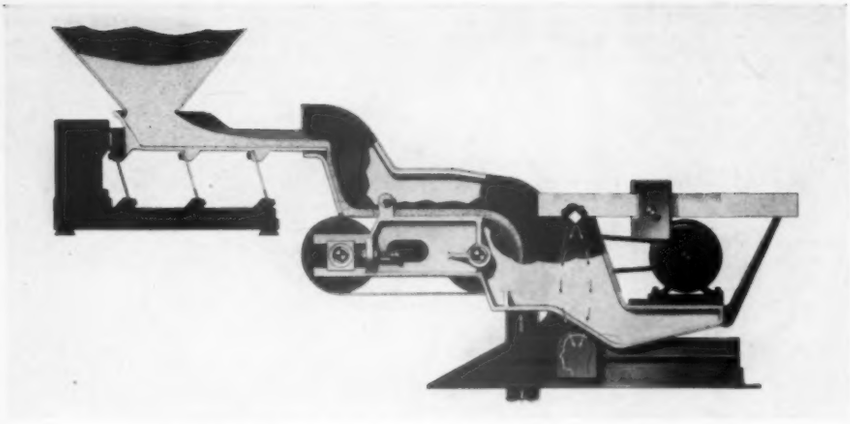
Original Sta-Tru screen with straight stay-rods. The new Sta-Tru screen with oval stay-bar weave.

The manufacturer offers a bulletin on Sta-Tru to any screen user who is looking for a long-mesh screen that will not stretch under tension.

Rubber Compound Is Applied Without Use of Primer

Since the application of a primer requires extra labor and extra time for drying, the research laboratory of the Self-Vulcanizing Rubber Co., Chicago, Ill., has carried on an exhaustive research and is now announcing Selfvulc Insulator. This is a rubber compound which incorporates the quality of a primer with a self-curing, cold-curing, rubber which can be applied by unskilled labor by dipping, spraying or by hand brushing.

This new product makes a steadfast bond in one application, but repeat coats to any desired thickness may be added. A vulcanizing period of one hour is all that is required for first or following coats. There is practically no shrinkage in application, the product being 90 per cent. pure rubber, and it gives a very smooth, enamel-like finish on any surface.



Sectional view of weighing and proportioning machine.

New Feeder Automatically Controlled by "Electric Brain"

A new precision machine applicable to the processes of continuous weigh-feeding, proportioning and batching, called the "Waytrol," is announced by the Jeffrey Manufacturing Co., Columbus, O. This machine combines these three features conducive to super-accuracy: (1) all-electric vibrating feeding, (2) synchronous weigh-belt on a scale beam so pivoted as to receive material at the most sensitive end, (3) automatic all-electric control sensitized through a device called the "electric brain."

On this unit feeding and weighing are physically separated processes. Furthermore, the rate of feed to the weigh-belt, which travels at constant speed, is in no way dependent on the volume of material handled, but is governed directly by weight . . . through the "electric brain," which registers any slight unbalance of the belt, and makes instant correction by speeding up or slowing down the vibrating feeder. For dustless operation and to avoid the possibility of error caused by wind pressure, the entire unit is enclosed in steel and glass. It operates from any standard 60-cycle current circuit.

Waytrols are available in sizes handling a few pounds up to many tons per hour. The smallest will handle granular material weighing 100 lb. per cu.ft. at a rate that can be varied from several pounds to a maximum of 4,000 lb. per hour. All will weigh to within 1 per cent. of absolute at least. Jeffrey Bulletin No. 644 describes the machine and its applications in detail.

Magnetic Separator Has Several New Features

A new modern design for its popular Type L magnetic separator is announced by the Stearns Magnetic Mfg. Co., formerly Magnetic Mfg. Co., Milwaukee, Wis.

Several new features are incorporated in this new model, the principal one being the self-contained complete drive. The motor can be operated from any convenient a.c. source available. The unit is also equipped with generator where d.c. is not available, the motor being sufficiently large to drive both generator and separator.

Operating units are entirely concealed so that all moving parts are thoroughly protected. This provides complete safety for the operator. Anti-friction bearings are used throughout. Transmission is by roller-chain with cut steel sprockets. The adjustable pin-type feed hopper has been lowered into the frame, making it a decided advantage where hand labor is used for feeding material.

The Type L is being successfully used in the treatment of abrasives, fertilizer materials, glass sand, silica and other materials.

Announces New Line of V-Type Vertical Compressors

The Sullivan Machinery Co., Michigan City, Ind., announces a new line of "V" vertical air-compressors particularly suited to conditions where air capacities greater than obtainable from portable compressors are desired. Known as the WN-102 series, these compressors are available in three sizes: 445, 550 and 720 cu. ft. per min. actual air delivery (displacement 536, 660 and 856 cu. ft. per min.). The design is two-cylinder "V" type, two-stage and double-acting. Each size is self contained and requires no water service connections for cooling.

EVANSTEEL
FOR WEAR

DIPPER TEETH
BUCKET LIPS
TOOTH POINTS
DRAG CHAINS
SPROCKETS
SHEAVES
GEARS
LINERS
SCREWS
SCREENS
GRIZZLIES
HAMMERS

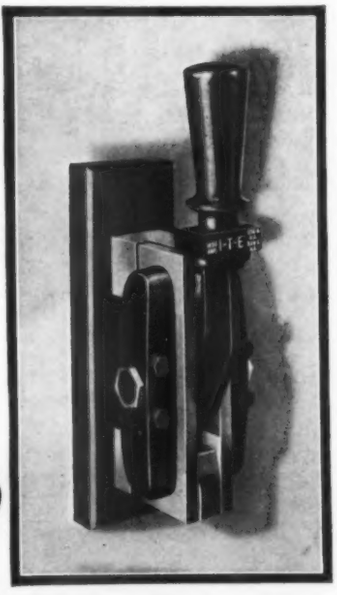
EVANSTEEL is a Chrome-Nickel-Moly-Heat Treated Alloy

Chicago Steel Foundry Co.
Kedzie Avenue at 38th Street
CHICAGO, ILL.
MAKERS OF ALLOY STEEL FOR 25 YEARS

BACON FARREL CRUSHERS

Complete Plants Designed and Equipped.
Screens, Elevators, Conveyors, Quarry, Sand and Gravel Plant Equipment.
Engineering Service.

EARLE C. BACON, Inc.
17 John Street New York, N. Y.



The **KLAMP-TITE** *Switch*

Recognized as a marked improvement in knife switch construction, the KLAMP-TITE holds its contacts under thousands of pounds constant pressure. One throw of the handle completes closing and clamping action.

An ideal switch for DUSTY installations

KLAMP-TITES add safety in cement plants and allied industries where dependability is law. *Send for Bulletin 1136.*

I-T-E CIRCUIT BREAKER CO.
Philadelphia, Pa. Dept. R *Offices in Principal Cities*

STROUDSBURG
HOISTING MACHINERY
Steam • Electric • Gasoline

The above photograph shows a Stroudsburg 50 HP. Electric Hoist used by the Chemical Lime Co., Bellefonte, Pa., for pulling cars from mines.

Write us for particulars and Bulletins I and G.

Stroudsburg Engine Works
STROUDSBURG, PA.

Any type of drive—direct connected, V-belt or flat-belt—can be used with Diesel or gasoline power units or electric motor. Either complete units consisting of compressor and power unit on skid type bases or the compressor only can be supplied.

Qualities stressed are smooth running balance, maximum power economy, precision construction throughout, ability to give reliable service over a long period of life, ease of transportation and minimum set-up expense. Some of the distinctive features of design are ball main bearings, complete force-feed lubrication, honed alloy cylinder liners, honed alloy crosshead guides, unusually efficient, long life air valves, water and dust-tight crankcase and precision type connecting-rod bearings.

Alternating Current Used by New Feeder

The Allis-Chalmers Mfg. Co., Milwaukee, Wis., is introducing a new type of feeder to handle ore, stone, chemicals, or other material that must be fed at a highly-uniform rate. This Utah electro-magnetic feeder, new in principle, rugged in construction, was originated by the Utah Copper Co. and was developed in coöperation with its engineers. It uses standard alternating current without resorting to expensive auxiliary equipment such as motor-generator sets. The entire unit is simplicity itself, having no sliding or rotating parts, no bearings, nothing to lubricate, nothing to wear out, and is said to be low in operation and maintenance cost.

The power unit of the Utah electro-magnetic feeder receives its operating energy through a small rectifier mounted on the wall together with a small auto-transformer and amplitude speed-adjusting switch. It consists of a straight line reciprocating armature mounted between two pole pieces. The rectifier splits the alternating-current cycle, one half of the *sine* wave being sent to one of the pole pieces and the remaining half to the other pole. The armature does not touch the magnets or pole pieces, proper air gaps being provided. Since there is no contact and no sparking the unit is well adapted for use in explosive atmospheres.

The feeder may be had in two types, one suspended and the other rubber mounted on the foundation. It can be built in any size or form of deck to suit the application. It can be supplied in types to handle material at high temperatures, in all enclosed types for dusty materials, or in tubular types for special uses. In addition to ordinary feeding and conveying it is an ideal unit for delivering at a substantially uniform rate to crushers, screens, grinding mills, belt conveyors, concentrating equipment, etc., fines and coarse materials all traveling at the same rate. It is of interest to engineers in all material-handling plants.

Announce New Model Streamlined Trucks

Two new models, the EM rated at 20,000 lb. gross, and the EQ of 23,000 lb. gross, have just gone into production, according to announcement from Mack Trucks, Inc.

In the modern streamline styling of the two new models, Mack has carried out the same general design introduced last year on the EH, an 18,000-lb. gross model.

Models EM and EQ are offered in four standard wheelbase lengths from 146 in. to 194 in. for the truck, three wheelbases from 141 in. to 158 in. on the tractor.

The Model EM is powered by a 6-cyl. engine developing 79 hp. at governed speed of 2,300 r.p.m. Total piston displacement is 310 cu. in. Model EQ has a powerplant generating 92 hp. at governed speed of 2,300 r.p.m. with 354 cu. in. of piston displacement.

MODERNIZE *for* PROFITS

BIG BUSINESS AHEAD IN STIMULATION OF CONSTRUCTION INDUSTRIES

Road building and construction generally will earn quick, substantial profits on investments in modernization. Plan now to safeguard these profits by replacement of inadequate, outworn weighing equipment.

MODERNIZE with HOWE

Wherever there is a weighing problem in your plant—railway track scales, motor truck scales, batcher scales, balance indicators, Weightographs—there's profit in investing in HOWE equipment. Consult the HOWE representative or write today to The Howe Scale Company, Dept. P-5, Rutland, Vermont. Branches and warehouses in principal cities.

A HOWE BATCHER SCALE
is used in this ready-mixed concrete plant operated by the Metropolitan Water District, Los Angeles, Cal.

HOWE Scales
HOWE FAMOUS FIRST IN 1857

BIN-DICATOR
BIN LEVEL INDICATOR

Positive Control . .
In the Handling of All Bulk Materials

•

BIN-DICATORS are used in the new plant of the CHEMICAL LIME COMPANY described in this issue.

Their use in the industry is more fully described on page 376 of the new PIT AND QUARRY HANDBOOK.

•

THE BIN-DICATOR CO.
DETROIT, MICHIGAN
14615 E. Jefferson Ave.

The Model EQ chassis, rated at 23,000 lb. gross. Note deep frame and modern treatment of the cab, hood and fenders.

Industrial Gasoline Engines Have Many Economy Features

A new series of 4-cyl. industrial engines known as Series F400 has just been released to the trade by Continental Motors Corp. There are three engines in the series—124, 140 and 162 cu. in. displacement, respectively.

This series incorporates the exclusively patented feature of individual porting, which makes possible a perfectly balanced uniform flow of fuel, eliminating the "starved" or "lazy" cylinder. Under this system of individual porting absolute equality of firing impulses is obtained, eliminating roughness and vibration, thus increasing engine life. Because a uniform mixture is delivered to each cylinder the economy of operation is greatly increased.

The engines have full-length water jackets with a front-end pump which discharges in a gallery under the valve ports, thus placing the coldest water directly where it is needed.

The crankshafts are of rugged design and weigh 35 lb. Crankshaft main bearings are 2¼ in. in diameter.

Refractory Gun Repairs Kiln Linings While Hot

When the refractory lining of a rotary cement or lime kiln becomes worn or broken, a "hot spot" develops which often forces a shut-down to allow the kiln to cool before the spot can be built up with new refractory material.

With the Quigley refractory gun, a development of the Quigley Co., New York, N. Y., these can usually be repaired without shutdown by the use of long extension nozzles which apply the refractory material under pressure. The gun, mounted on three wheels, can easily be moved about the plant and is said to pay for itself in a few hours by the savings eliminated through production losses.

The Quigley gun handles premixed, properly seasoned refractory mixtures, of the required consistency for the job. Either light or heavy mixtures may be employed.

Among the many users are the Alpha Portland Cement Co., Lehigh Portland Cement Co., Marquette Cement Mfg. Co., Southwestern Portland Cement Co., and the Universal Atlas Cement Co.

A study of the natural resources and industrial development of North Carolina is developed in *North Carolina Today and Tomorrow* compiled by the Department of Conservation and Development of North Carolina. Copies are available for 50 c. by addressing the Department at Raleigh, N. C.

Develops Solid-Rubber-Roll Impact Belt-Carrier Idler

The Stephens-Adamson Mfg. Co., Aurora, Ill., has gone into extensive production on a new solid-rubber-roll impact belt carrier as a result of having recently developed a carrier of this type for the Inland Lime & Stone Co., Port Inland, Mich.

This belt carrier is particularly unique by reason of its heavy 1⅞-in. covering of vulcanized rubber extending entirely around the 2¼-in. diameter pressed steel hub of the roller, with bottom layer of the roll vulcanized to the steel hub. The solid roll is formed from

HYDRAULIC DREDGES
Built to Your
REQUIREMENTS

Adaptable to a wide range of applications in excavating material, the hydraulic dredge has distinct advantages in great capacity and extremely low cost per cubic yard of operation.

American Hydraulic Dredges have an additional advantage, because they are built to the purchaser's specific requirements by engineers long experienced in this field.

If pumping operations can be used for your work, it will be to your advantage to look into the possibilities with American Hydraulic Dredges. Our engineers will be glad to consult with you.

AMERICAN STEEL DREDGE CO.
INCORPORATED
Ft. Wayne, Indiana

A better job at lower cost

From river to washing screens through 5,000 feet of Taylor Spiral Welded Pipe.

FOR dredging lines, pontoon lines, sand and gravel lines, water lines—any service where a light-wall pipe is suitable—Taylor Spiral Welded Pipe will perform that service with half the weight that would be required if standard wrought steel pipe were used. This lighter weight means lower first cost, lower shipping costs, lower installation costs. Yet Taylor Spiral Pipe gives surprisingly long wear. There is a size and gauge for every light-walled pipe service—with protective coatings to meet any condition.

TAYLOR FORGE & PIPE WORKS
General Offices and Works: Chicago, P. O. Box 485
New York Office: 50 Church St. • Pittsburgh Office: Gulf Building

TAYLOR *Spiral* PIPE

ASK FOR CATALOG 36

YOU PAY LESS FOR PIPE *Like this*

LIGHTER WEIGHT.. LONG WEARING... HIGH CARBON MANGANESE STEEL

Uniweld Pipe has two distinct advantages for abrasive service. Made of special high carbon-high manganese steel, it has unusual resistance to abrasive action: Because of this great wear resisting quality Uniweld Pipe can be made in lighter gauges which facilitates handling in the field.

As Uniweld compares in price with other pipe and has a considerably longer service life, it costs less in the end. For service, for ease of handling and for economy specify Uniweld Pipe. It can be furnished in different sizes, lengths and various types of ends to suit your particular requirements. Write for information.

WELDING ENGINEERS · UWCO · MIDDLETOWN, OHIO ·

UNIWELD PIPE

THE UNITED WELDING CO.
MIDDLETOWN, OHIO

Six mixer trucks of the I. E. Schilling Co., Miami, Fla., parked on Biscayne Blvd. with the exhibit building of the Ford Motor Co., for which these trucks supplied all concrete, in the background. The Schilling Company was one of the pioneers in the ready-mixed-concrete industry. The mixer units are those built by the Concrete Transport Mixer Co., St. Louis, Mo.

numerous layers of rubber wound about the hub, each layer vulcanized to the other.

The carrier is of specific value to the user of conveying machinery under loading points, in belt feeders, and under the entire length of movable shuttle conveyors, where conveyed material is received.

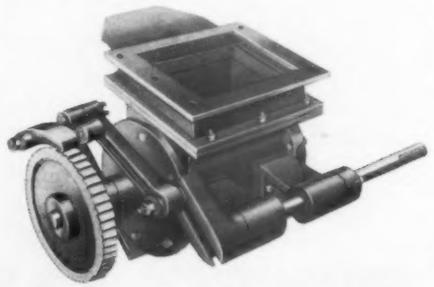
The carrier is built in two styles, the normal and heavy-duty types. It is tilted to train the belt without guide rollers, and the three 6-in. rollers from a 20-deg. trough. The carrier can also be furnished for flat belts.

Feeder for Fine Materials Provides Continuous Flow

A small feeding mechanism of simple and positive performance, adaptable for feeding hydrated lime and other small size materials from storage bins and hoppers to bucket elevators, screw conveyors, spouts, chutes and screens, has just been announced by Arnold & Weigel, Inc., Woodville, O.

Feeding is done by a spiral rotor of special design, which provides a steady and continuous flow of material.

The "W" Series feed roll, as it is to be known, is made in three sizes, which makes possible a wide range of capacities. It can be



Feed roll for handling finely-ground materials.

furnished with an agitating hopper, where the material bin is liable to bridge and hang up.

The feed roll can be furnished with extended shaft as shown in illustration, for belt drive to countershaft, or it can be supplied with an individual reducer-motor drive. The entire feeding device is enclosed in a dust-proof cast-iron housing, eliminating leakage, and material can only pass when the roll is in operation. It is supplied in three sizes.

Sells Scales on Deferred Payments

The Buffalo Scale Co., Buffalo, N. Y., announces a new plan for the immediate installation of new truck scales with low cash outlays as a helpful aid in meeting present-day higher operating costs, increased sales volume, narrowing net profit margins, together with the very definite trend toward delivering by weight instead of by bulk.

The increasing use of heavy trucks, combining high tonnages, sudden starting and stopping shocks on the scales and other operating and management factors, has created a demand for new scale equipment to meet present-day conditions in the gravel field.

"Naturally the purchase of a new scale is a capital investment and this Buffalo plan is being featured as a contribution to the industry which will be helpful in accurately weighing deliveries and at the same time distributing the cash outlay over a period of time," stated Theodore L. Richmond, Jr., president of the Buffalo Scale Co. "Actually we have taken a leaf from the Motor Truck Manufacturer's book and applied it to the scale industry. The Buffalo plan provides modern, accurate scale equipment for immediate installation and at the same time leaves necessary working capital available for handling increased business."

TRADE NOTES

The Pennsylvania Pump & Compressor Co., Easton, Pa., has announced the appointment of the following district representatives:

McVoy-Hausman Co., 2019 Sixth Ave., No. Birmingham, Ala.; John A. Dodd, 101 Marietta Bldg., Atlanta, Ga.; Ryan Sales Corp., 160 Second Ave., No., Nashville, Tenn.

The Brown-Bevis Co., Los Angeles, Cal., has been appointed by the Nordberg Mfg. Co., Milwaukee, Wis., to handle the sale of Symons cone crushers in southern California. The remainder of the state will continue to be covered by the Nordberg company's own branch office in the Subway Terminal Bldg., Los Angeles.

Trade Literature

Brooks-Taylor Lime Putty Plants. 8 p. Brooks-Taylor Co., Inc., Birmingham, Ala.

American Locomotive Cranes. 16 p. American Hoist & Derrick Co., St. Paul, Minn.

Marmon-Herrington All-Wheel Drive. 4 p. Marmon-Herrington Co., Inc., Indianapolis, Ind.

Jaeger Giant Catalog. 16 p. Jaeger Machine Co., Columbus, O.

3742 Satisfied Users. 8 p. (Dust-collecting equipment). Pangborn Corp., Hagerstown, Md.

A New "High" in Chimneys. (Folder) Weber Chimney Co., Chicago, Ill.

Building a Career in Arc Welding. 12 p. Lincoln Electric Co., Cleveland, O.

Brown Pyrometers—Millivolt Type. 40 p. Brown Instrument Co., Philadelphia, Pa.

Utah Electro-Magnetic Vibrating Screen. 4 p. Allis-Chalmers Co., Milwaukee, Wis.

Haynes Stellite J—Metal Cutting Tools. 52 p. Haynes Stellite Co., Kokomo, Ind.

Cedar Rapids Roller Bearing Crushers. 8 p. Iowa Manufacturing Co., Cedar Rapids, Ia.

Worthington Opposed Steam-Driven Compressors. 20 p. Worthington Pump & Machinery Corp., Harrison, N. J.

Industrial Guide for the Selection of Wire and Cable. 32 p. Anaconda Wire & Cable Co., New York, N. Y.

Modernized . . . All at Lower Cost. (Construction Book No. D-8) 24 p. W. E. Dunn Mfg. Co., Holland, Mich.

Owen Buckets. 26 p. The Owen Bucket Co., Cleveland, O.

Insley ⅛-Yard Full Revolving Type K Excavator. 16 p. Insley Manufacturing Corp., Indianapolis, Ind.

Ransome Truck Mixers and Agitators. 16 p. Ransome Concrete Machinery Co., Dunellen, N. J.

Telesmith Gyrasphere Crusher. 16 p. Smith Engineering Works, Milwaukee, Wis.

Incorporations

THE MULTIPLEX CONCRETE PRODUCTS, INC., Lindhurst, N. J. Capital $125,000.

POROUS CONCRETE DRAIN PIPE CORP., Hoboken, N. J. 2,500 shares n.p.v. Correspondent: M. H. Klein, 51 Newark St., Hoboken, N. J.

SILICA ROCK ASPHALT CO., Hugo, Okla. Capital $25,000. Correspondent: Butler Disman, 403 Rieger Bldg., Kansas City, Mo.

M & M CONCRETE PRODUCTS CO., Rahway, N. J. 100 shares n.p.v. Correspondent: John E. Barger, Rahway, N. J.

MUNNSVILLE LIMESTONE CORP., Munnsville, N. Y. Capital $25,000. Correspondent: Donald Davison, Munnsville, N. Y.

BLUE JAY CAST STONE CO., Madison, Wis. 50 shares preferred, 100 shares n.p.v. common. Correspondent: R. Cannon, Madison, Wis.

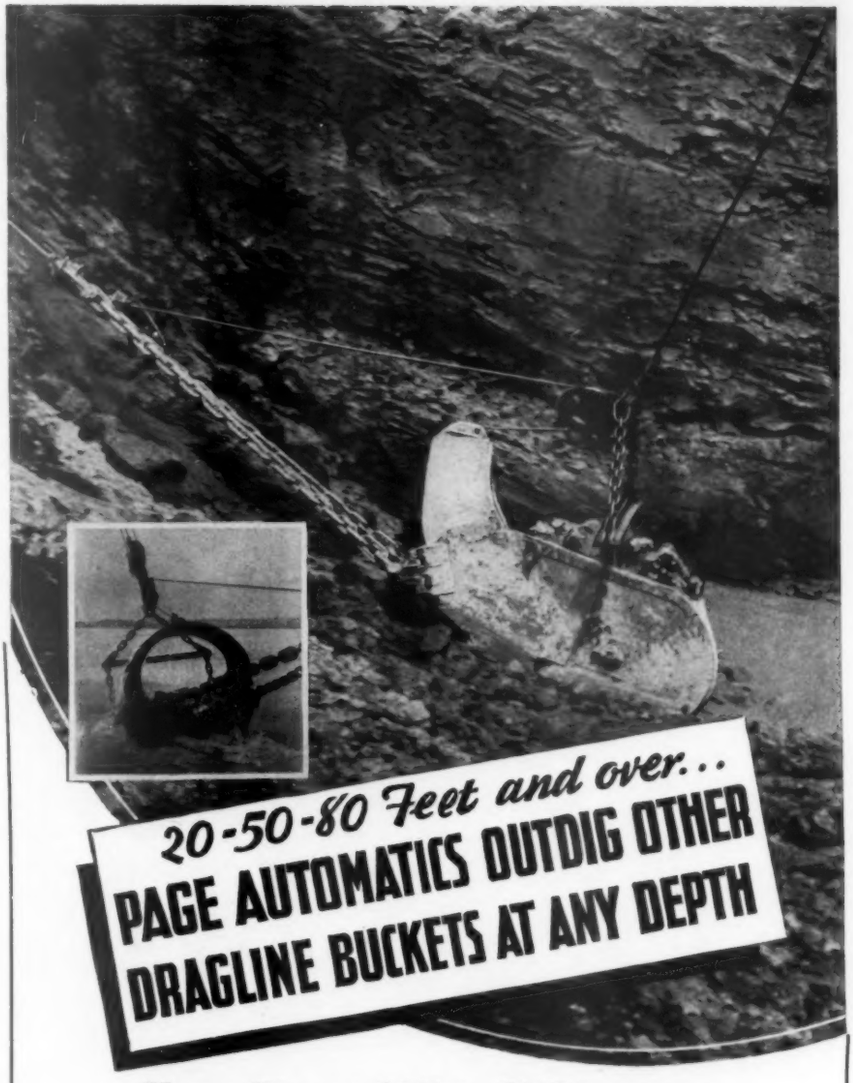
MILLS ROCK CO. OF MIAMI, INC., Miami, Fla. 50 shares n.p.v. Correspondent: F. G. Murphy, Miami, Fla.

SAND MOUNTAIN SAND CORP., Wytheville, Va. $50,000. Correspondent: C. R. Huddle, Ivanhoe, Va.

SAYLOR SILICA CORP., Chicago, Ill. 500 shares n.p.v. Correspondent: C. F. Saylor, 111 So. La Salle St., Chicago, Ill.

THE BELL STONE CO., Pineville, Ky. Correspondent: James H. Jeffries, Pineville, Ky.

THE NORTHWESTERN LIME CO., Portland, Ore. 1,000 shares of n.p.v. common stock. Correspondent: C. A. Bingham, Portland, Ore.



Users Report 20% to 50% increase in yardage on all types of dragline work

An Automatic Owner writes: *"The AUTOMATIC bucket will dig in deep holes as long as you keep rope long enough to go deeper. We have been convinced that this bucket has increased our production at least 75%."*

A gravel plant owner says: *"It comes up with a full load when working blind under 15' of water."*

A contractor reports: *"Since putting on the AUTOMATIC we are digging at least 50% more material."*

As hundreds of AUTOMATIC owners have done—you, also, can increase your dragline yardage and profits. For information on a size and weight AUTOMATIC bucket best fitted to your machine and job, see your equipment dealer or write us direct. Free bulletin "The AUTOMATIC" gladly sent on request. Address Dept. F.

BUILT IN SIZES 3/8 to 15 CUBIC YARDS

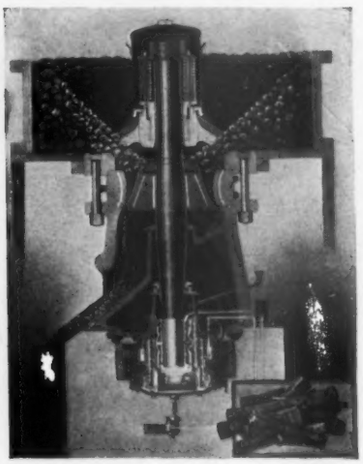
"Dig with a PAGE AUTOMATIC"

PAGE ENGINEERING COMPANY
CLEARING POST OFFICE CHICAGO, ILLINOIS

QUARRY MEN!!!

CAN YOU DUPLICATE THESE RESULTS?

THE ANSWER IS "YES"
IF YOU USE A KENNEDY CRUSHER



Secondary Gearless Gyratory Crusher

Using a **25 HP** Synchronous Motor **56 tons** per hour were crushed in a recent test—the feed to the No. 25 Kennedy Crusher was minus 2" plus 1" trap rock (one of the hardest in the eastern part of the United States), resulting in the following sifting test when crushing single pass without any returns from the screen:

MINUS	1"			100%
PLUS	3/4"			7
MINUS	3/4"	PLUS	9/16"	14
MINUS	9/16"	PLUS	3/16"	63
MINUS	3/16"			16

KENNEDY CRUSHERS ARE SUPREME IN THE FIELD OF FINE OR COARSE CRUSHING FOR SMALL OR LARGE TONNAGES

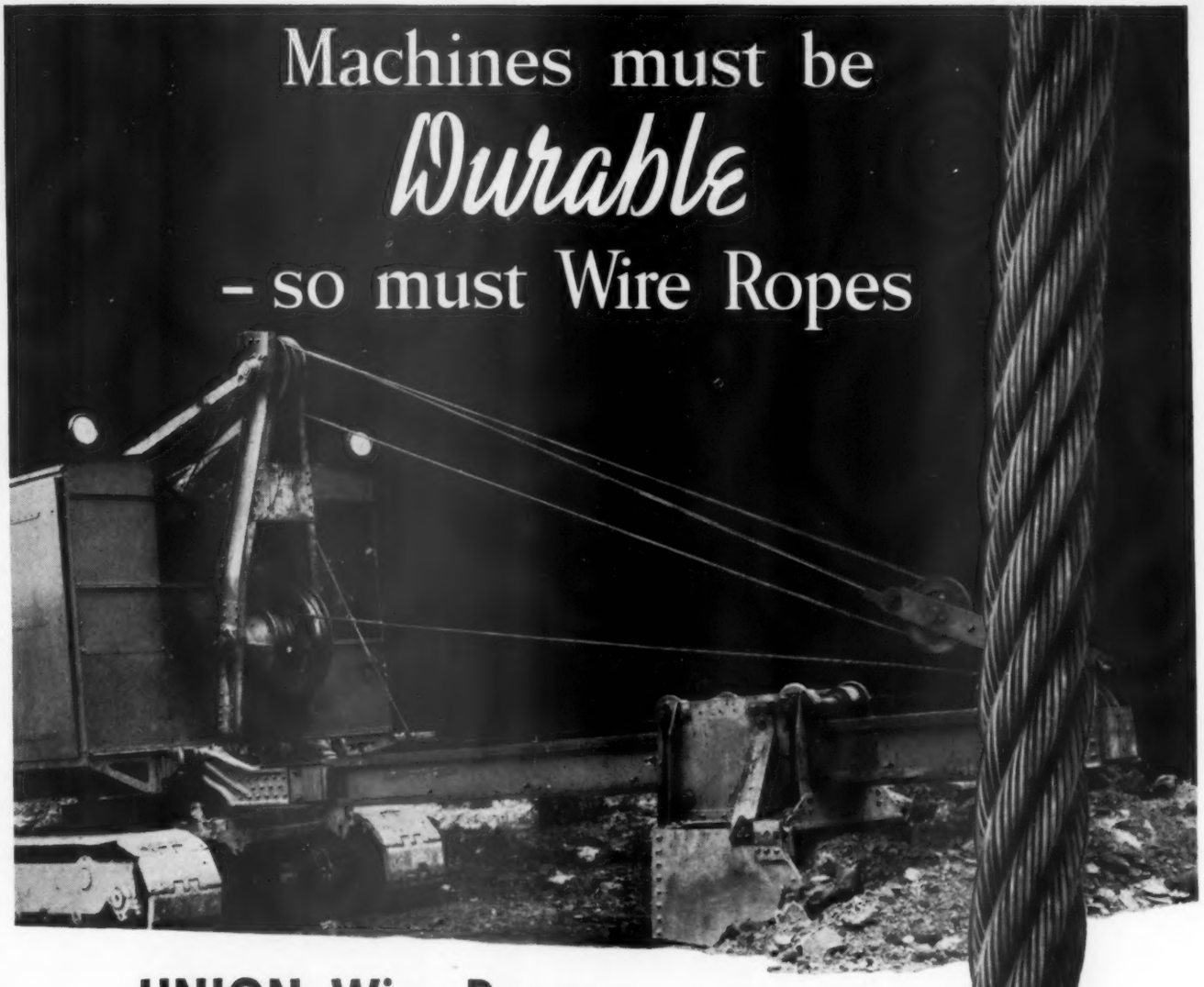
If interested please wire at our expense and one of our Engineers will call on you without obligation on your part.

KENNEDY-VAN SAUN MFG. & ENG. CORP.

2 Park Avenue **New York, N. Y.**

Sales Agents in all Principal Cities of the United States

Machines must be *Durable* – so must Wire Ropes



UNION Wire Ropes are EXTRA DURABLE

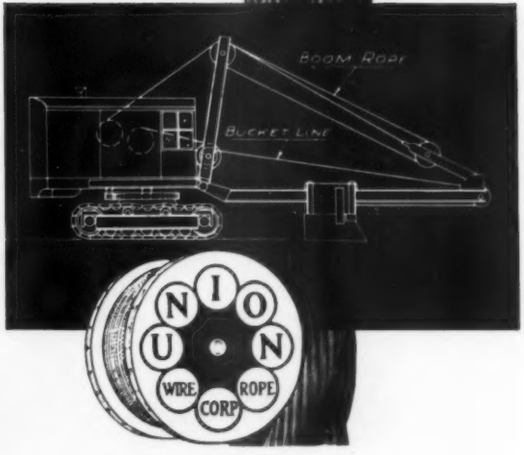
Your machines have to be "durable." They must be soundly designed and built of long-lasting materials, to give dependable and economical service.

Your wire ropes also must be *durable*, to insure long service and thus save operating dollars. The *extra* durability characteristic of UNION Wire Ropes is a result of—(1) Superior Design; (2) Highest Quality Materials, carefully selected to resist usages; (3) Expert Fabrication; (4) Thorough Testing, to insure the uniform high quality of each finished rope.

To save money, equip your machines with UNION Ropes, and use the *correct* type and size for *each* service. Our line of ropes is complete, including both ordinary type and "preformed" (UNION formed). If you have questions as to correct rope usage, write our engineers for their recommendations.

Ropes For Skimmers

Diagram shows the wire ropes used on Skimmers. Different makes of machine have different rope requirements. In writing for the recommendation of our Engineers, give full classification data on each machine you are using.



UNION WIRE ROPE CORPORATION

General Office and Factory: 21st and Manchester, Kansas City, Mo.
Chicago District Office: 53 W. Jackson Blvd.
Chicago Warehouse: 1729 W. 74th St., Telephone Harrison 8700
Portland, Ore.: 2415 N. W. 22nd Ave.
In Mexico: E. O. Chapa, Calle Damas Sur 13, Tampico—Madero 2, Mexico D. F.
Export Agents: Lucey Export Corp. (Exclusive)
3505 Woolworth Bldg., N. Y. Broad St. House, London, E. C. 2, England
Distributors in Leading Cities throughout the Country

UNION WIRE ROPES

The ULTIMATE LOW COST WIRE ROPE

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

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*Warren Brothers Roads Co.

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Bin-Dicator Co.

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Pennsylvania Drilling Co.

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*General Electric Co.

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*Tyler Co., W. S.

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Buckets (Clamshell, Orange-Peel, Etc.)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Erie Steel Construction Co.
Haiss Mfg. Co., Geo.
*Harnischfeger Corp.
*Link-Belt Co.
Owen Bucket Co.
Wellman Engr. Co.

Buckets (Dump)
*Jaeger Machine Co.

Buckets (Dragline—Cableway)
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Bucyrus-Erie Co.
*Erie Steel Construction Co.
*Link-Belt Co.
Page Engr. Co.
*Pioneer Gravel Equip. Mfg. Co.
*Sauerman Bros., Inc.
Wellman Engr. Co.

Buckets (Elevator and Conveyor)
Bartlett & Snow Co., C. O.
*Chain Belt Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
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*Koehring Co.
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Calcium Chloride
*Calcium Chloride Association

Caps (Blasting)
Du Pont de Nemours & Co., Inc.

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Car Dumpers
*Link-Belt Co.
Wellman Engr. Co.

Car Liners (Paper)
Hummel-Foley Corp.

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Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Carriers
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
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Smith Engr. Works

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*Eagle Iron Works
Frog Switch Mfg. Co., The
*Hardinge Co.
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.

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Central Concrete Mixing Plants (Comp.)
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*Erie Steel Construction Co.
*Jaeger Machine Co.

Chain Attachments
*Chain Belt Co.
*Jeffrey Mfg. Co.

Chain (Dredge and Shovel)
Manganese Steel Forge Co.

Chain Drives
*Chain Belt Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Chain (Elevating and Conveying)
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*Portable Machy. Corp.

Chute Lining (Rubber)
Goodyear Tire & Rubber Co

Chutes and Chute Liners
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
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McLanahan and Stone Corp.
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Classifiers
*Deister Machine Co.
*Hardinge Co.
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*Jeffrey Mfg. Co.
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Simplicity Engr. Co.

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*Allis-Chalmers Mfg. Co
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Universal Concrete Pipe Co

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*Koehring Co.

Cones (Sand-Washing)
Bartlett & Snow Co., C. O.
Iowa Mfg. Co.
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Smith Engr. Works

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*General Electric Co.

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*General Electric Co.

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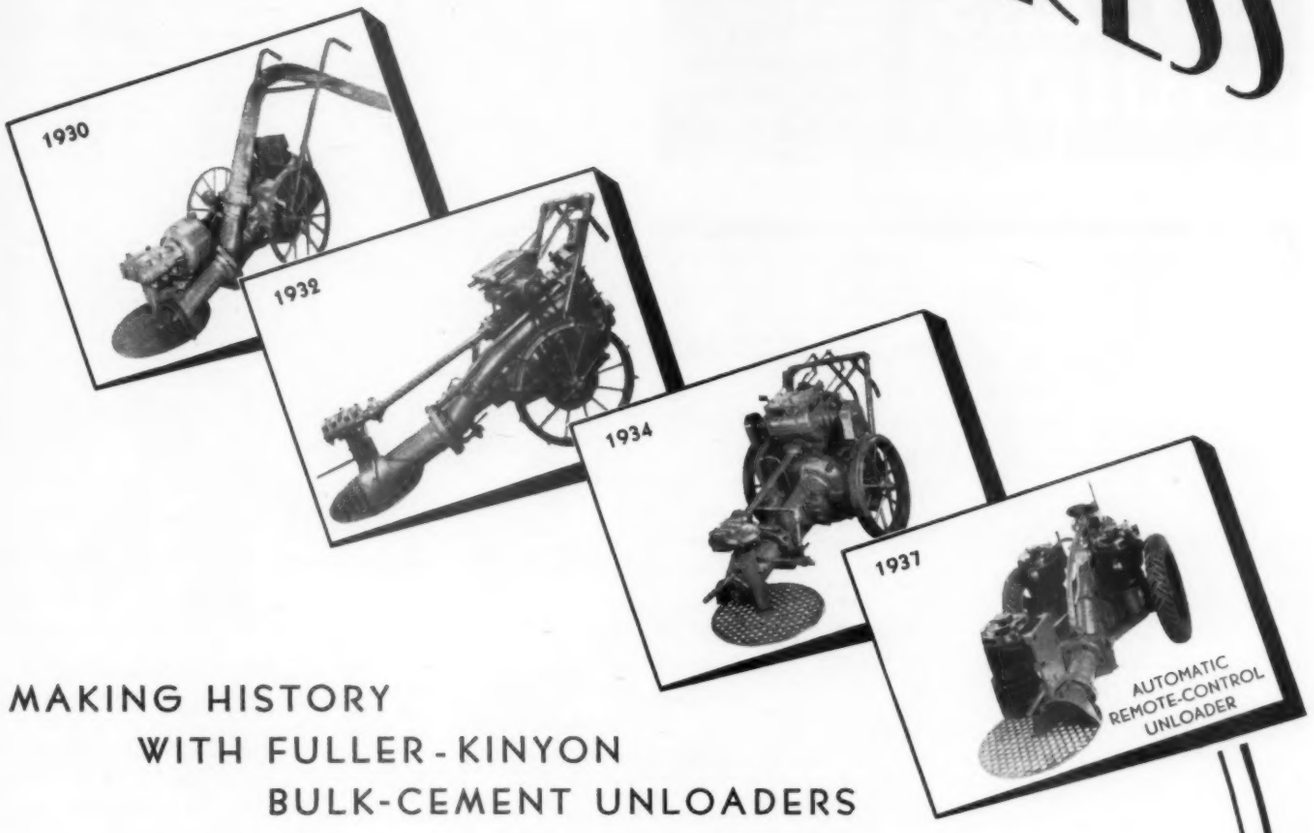
Bartlett & Snow Co., C. O.
*Chain Belt Co.
Diamond Iron Works, Inc.
Haiss Mfg. Co., Geo.

* See also information in the 1937 Pit and Quarry HANDBOOK.

THE PARADE OF PROGRESS



MAKING HISTORY WITH FULLER-KINYON BULK-CEMENT UNLOADERS

The great American spirit, progress, is exemplified by the steady refinements and improvements to the Fuller-Kinyon Portable Unloader.

Starting in 1930, with the increased demand for cement shipments in bulk on construction work such as highways, bridges, large buildings, and ready-mix concrete plants, the Fuller Company, pioneers in conveying pulverized materials through pipe lines, built and placed in service the first Fuller-Kinyon Unloader. This machine filled a much felt need, although a far cry from the new Fuller-Kinyon Automatic Remote-Control Unloader.

Always pioneering, and the aim to do a better job, Fuller engineers kept everlastingly at it, with the result that today the Company can offer, with the utmost confidence, this really efficient and unique machine.

SAFETY—Safe for use in cement mill stockhouses. Remote control keeps the operator out of the bin...out of danger from slides...out of the dust.

As illustrated, this latest model is everything that the name implies, a machine that can be handled by remote control at a distance by means of a hand control switch. Starting and stopping; movements of the machine: forward, backward, right or left, all are governed from this simple control.

These are only a few of the distinctive features. For complete details send for your copy of the folder fully describing and illustrating the Fuller-Kinyon Automatic Remote-Control Unloader.

FULLER COMPANY

CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg.

San Francisco: 320-321 Chancery Bldg.

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FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · AUTOMATIC BATCH WEIGHERS · · · BIN SIGNALS

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Robins Conveying Belt Co.
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*Fuller Company

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Toro Manufacturing Corp.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
New Holland Machine Co.
Toro Mfg. Corp.
*Williams Patent Crusher & Pulverizer Co.

Crushing Rolls
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Cutters
American Steel Dredge Co.

Detonators
Du Pont de Nemours Co., Inc.

Diesel Engines (See Engines—Diesel)

Dipper Parts
American Manganese Steel Co.
*Bucyrus-Erie Co.
Frog Switch Mfg. Co., The

Dippers and Teeth (Power Shovel)
American Manganese Steel Co.
*Bucyrus-Erie Co.
Frog Switch Mfg. Co., The
*Koehring Co.

Doors (Car)
Hummel-Foley Corp.

Dragline Cableway Excavators
*Good Roads Machinery Co.
*Link-Belt Co.
Page Engr. Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Bucyrus-Erie Co.
*Erie Steel Construction Co.
*Harnischfeger Corp.
*Koehring Co.
*Lima Loco. Works, Inc.
*Link-Belt Co.
Michigan Power Shovel Co.
Northwest Engr. Co.
Page Engr. Co.
Thew Shovel Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredges
American Steel Dredge Co.
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Dredges (Dipper)
American Steel Dredge Co.

Dredges (Hydraulic)
American Steel Dredge Co.

Drilling Accessories
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
Worthington Pump & Machy. Corp.

Drill Bit Reconditioning
Rock Bit Sales & Service, Inc.

Drill Bits
Rock Bit Sales & Service, Inc.
Timken Roller Bearing Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Armstrong Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
Worthington Pump & Machy. Corp.

Drills (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Diamond)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Hand-Hammer)
Cleveland Rock Drill Co.
Gardner-Denver Co.
Worthington Pump & Machy. Corp.

Drills (Rock)
*Bucyrus-Armstrong Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
*Jeffrey Mfg. Co.
Worthington Pump & Machy. Corp.

Drill Sharpening Machinery
Gardner-Denver Co.

Drill Steel
Cleveland Rock Drill Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple, Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.
*Chain Belt Co.
Worthington Pump & Machy. Corp.

Dryers
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mch. Co.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Dust Arresters
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Parsons Engineering Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Blaw-Knox Co.
*Parsons Engineering Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Fuller Company
*Parsons Engineering Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp

Dust Filters
*Parsons Engineering Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Dynamite (See Explosives)

Electrical Equipment
*Allis-Chalmers Mfg. Co.
*General Electric Co.
I T E Circuit Breaker Co.

Electrodes (Welding)
Stulz-Sickles Co.

Elevator Belting (See Belting)

Elevators (See Conveyors and Elevators)

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
*Allis-Chalmers Mfg. Co.
*Arnold & Weigel, Inc.
Bacon, Inc., Earle C.
Bonnot Co.
*Fuller Company
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.

Engine Generator Sets
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Engines (Diesel)
Caterpillar Tractor Co.
*Cooper-Bessemer Corp.
National Supply Co. of Del., The
*Nordberg Mfg. Co.
Page Engr. Co.
Worthington Pump & Machy. Corp.

Engines (Internal-Combustion)
Caterpillar Tractor Co.
*Cooper-Bessemer Corp.
National Supply Co. of Del., The
*Nordberg Mfg. Co.
Page Engr. Co.
Wilson, K. R.
Worthington Pump & Machy. Corp.

Engines (Steam)
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
Haiss Mfg. Co., Geo.

Explosives
Du Pont de Nemours & Co., Inc.

Fabricating (Electric Arc and Oxy-Acetylene)
Smith Co., S. Morgan
Stultz-Sickles Co.
United Welding Co.

Fans (Exhaust)
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Arnold & Weigel, Inc.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Chain Belt Co.
Diamond Iron Works, Inc.
*Fuller Company
*Good Roads Machinery Corp.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
*Pioneer Gravel Equip. Mfg. Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Feed Water Heaters
Worthington Pump & Machy. Corp.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Forges (Oil)
Gardner-Denver Co.

Fuses (Detonating)
Du Pont de Nemours & Co., Inc.
*Ensign-Bickford Co.

Fuses (Electrical)
*General Electric Co.

Gaskets
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

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Gas Producers
Wellman Engr. Co.

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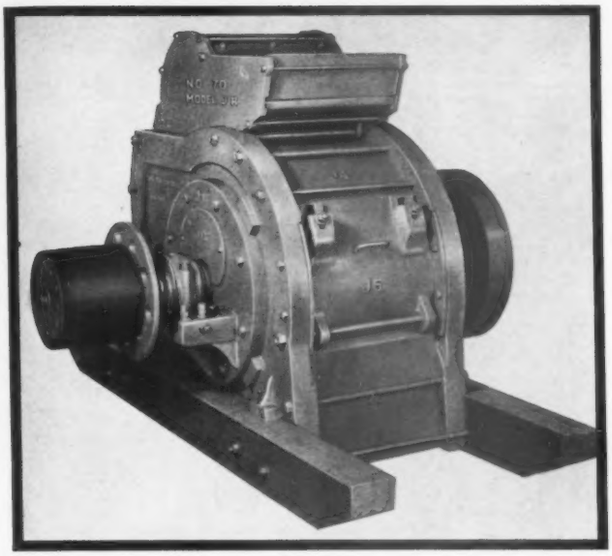
Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gears (Herringbone)
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*General Electric Co.

*See also information in the 1937 Pit and Quarry HANDBOOK.

Mr. Commercial Producer . . . .



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There is a great demand for a large volume of ground agricultural lime, NOW. Thousands upon thousands of farmers are wanting this product immediately. The Federal Conservation Program will probably continue for many years. . . . Don't Wait—cash in at once on this immediate business.

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Complete Engineering Service **including Plant Surveys, Dust Determination, Dust and Fume Control and Odor Elimination.**

Cottrell Electrical Precipitators **for dust collection in Cement Plants, Smelters, Refineries, and for dust and fume control in Paper Mills, Acid Plants and general industries.**

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SPECIALISTS IN DUST AND FUME CONTROL FOR MORE THAN A QUARTER CENTURY

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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Republic Rubber Co.
Worthington Pump & Machy. Corp.

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*Link-Belt Co.
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*Allis-Chalmers Mfg. Co.
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*Hardinge Co.
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*Arnold & Weigel, Inc.
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*Arnold & Weigel, Inc.
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*Chicago Bridge & Iron Co.
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*Arnold & Weigel, Inc.
*Chicago Bridge & Iron Co.
*Hardinge Co.
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*Arnold & Weigel, Inc.
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Hardinge Co.
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Lime Putty Plants
*Chicago Bridge & Iron Co.

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*Jeffrey Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.
*Robins Conveying Belt Co.
Toro Mfg. Corp.

Locomotives (Diesel)
*Whitcomb Locomotive Co.

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*General Electric Co.
*Whitcomb Locomotive Co.

Locomotives (Electric, Gas, Kerosene and Steam)
*General Electric Co.
*Whitcomb Locomotive Co.

Locomotives (Gas Electric)
*General Electric Co.
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*Whitcomb Locomotive Co.

Locomotives (Oil Electric)
*General Electric Co.
*Whitcomb Locomotive Co.

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*General Electric Co.
*Jeffrey Mfg. Co.

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Manganese Steel Forge Co.

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*General Electric Co.

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*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Mill Liners and Linings
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Bartlett & Snow Co., C. O.
Carnegie-Illinois Steel Corp.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Traylor Engr. & Mfg. Co.

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*Allis-Chalmers Mfg. Co.
*Hardinge Co.
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
Day Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mch. Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
Toro Mfg. Corp.
*Traylor Engr. & Mfg. Co.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.
*General Electric Co.
*Harnischfeger Corp.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

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Hug Company

Motor Trucks (Dual Rear Axle Drive Units)
General Motors Corp.
Thornton-Tandem Co.

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*American Steel & Wire Co.

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Buffalo Wire Works Co.
*Tyler Co., W. S.

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*Chain Belt Co.
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Chain Belt Co.
*Deister Concentrator Co.

Packings
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Partitions (Wire)
National Wire Cloth Co.

Paving Mixers
*Chain Belt Co.
*Jaeger Machine Co.
*Koehring Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
*Hendrick Mfg. Co.

Pipe, Dredge (Floating and Shore)
*Chicago Bridge & Iron Co.
Taylor Forge & Pipe Works
United Welding Co.

Pipe Flanges
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Pipe Forms (Concrete)
Quinn Wire & Iron Works
Stroudsburg Engine Works
Universal Concrete Pipe Co.

Pipe Machines (Concrete)
Quinn Wire & Iron Works
Stroudsburg Engine Works
Universal Concrete Pipe Co.

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Taylor Forge & Pipe Co.
United Welding Co.

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*Fuller Company
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Iowa Mfg. Co.
*Jeffrey Mfg. Co.
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*Portable Machy. Corp.
*Robins Conveying Belt Co.

Portable Crushing and Screening Plants
Bartlett & Snow Co., C. O.
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*Good Roads Machinery Corp.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Pioneer Gravel Equip. Mfg. Co.
Toro Mfg. Corp.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

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*American Steel & Wire Co.

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Ready-Power Co.

Precipitators
*Western Precipitation Corp.

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*American Cable Division of the American Chain & Cable Co., Inc.
*American Steel & Wire Co.
Broderick & Bascom Rope Co.
Coast Cable Co.
Edwards Co., E. H.
*Hazard Wire Rope Division of the American Chain & Cable Co., Inc.
*Leschen & Sons Rope Co., A.
Macwhyte Company
Pacific Wire Rope Co.
Rochester Ropes, Inc.
*Roebling's Sons Co., John A.
Williamsport Wire Rope Co.
Wire Rope Corporation of America
Wire Rope Manufacturing & Equipment Co.

Proportioning Equipment
*Blaw-Knox Co.
*Erie Steel Construction Co.
*Jaeger Machine Co.
Schaffer Poidometer Co.

Pulleys
*Huron Industries Co.

Pulverized Fuel Systems
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Bros. Impact Pulv. Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.

Pulverizers (See also Crushers, Mills, etc.)
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
Day Pulverizer Co.
*Gruendler Crusher & Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
New Holland Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
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Toro Mfg. Corp.
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Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

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*Fuller Company

Pumps (Bulk Cement)
*Fuller Company

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Allen-Sherman-Hoff Co.
*Morris Machine Works

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Chain Belt Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Jaeger Machine Co.
*Morris Machine Works
Worthington Pump & Macny. Corp.

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Bucyrus-Erie Co.

* See also information in the 1937 Pit and Quarry HANDBOOK.

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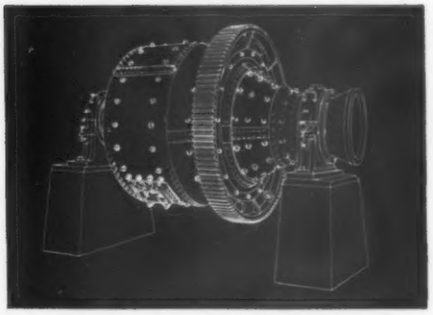
MORE money saved because Hardinge Conical Mills hold the *lowest maintenance cost records* among all pulverizers! Their uniform quality and smooth running take "grief" away, and their performance is backed up by volumes of data such as:



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Grinding limestone—Ball consumption 0.025 lbs. per ton
Liner life . . . . . 12 years

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Liner life . . . . . 9 years

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Liner life . . . . . 15 years

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You'll find ALL THREE in the MICHIGAN Truck Shovel, with convertibility and economy in the bargain! 25 mph. on the hiway, with ordinary truck economy is MOBILITY plus . . . Seasoned engineering and heavy duty construction spell DEPENDABILITY . . . And for operating speed and ease, MICHIGAN'S finger-tip AIR CONTROLS have no equal . . . The MICHIGAN quickly converts to crane, trench hoe, clam or dragline.

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MICHIGAN POWER SHOVEL COMPANY
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Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Pioneer Gravel Equip. Mfg. Co.
Simplicity Engr. Co.
Smith Engr. Works

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*Hardinge Co.

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Bartlett & Snow Co., C. O.
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*Good Roads Machinery Corp.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Pioneer Gravel Equip. Mfg Co.
Smith Engr. Works

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Stroudsburg Engine Works

Scales
Buffalo Scale Co.
Howe Scale Co.
Merrick Scale Mfg. Co.

Scales (Track or Truck)
Buffalo Scale Co.
Howe Scale Co.
Merrick Scale Mfg. Co.

Scrapers (Power Drag)
Iowa Mfg. Co.
*Link-Belt Co.
*Pioneer Gravel Equip. Mfg. Co.
*Sauerman Bros., Inc.

Screens
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Audubon Wire Cloth Corp.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
Carnegie-Illinois Steel Corp.
*Chain Belt Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
*Deister Concentrator Co.
*Deister Machine Co.
Diamond Iron Works, Inc.
*Eagle Iron Works
*Good Roads Machinery Corp.
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
*Hardinge Co.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
National Wire Cloth Co.
*Nordberg Mfg. Co.
*Pioneer Gravel Equip. Mfg. Co.
*Portable Machy. Corp.
Productive Equip. Corp.
*Roebling's Sons Co., John A.
*Robins Conveying Belt Co.
Simplicity Engr. Co.
Smith Engr. Works
Sturtevant Mill Co.
Toro Mfg. Corp.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
Universal Crusher Co.
Universal Road Machy. Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Deister Concentrator Co.
*Deister Machine Co.
Diamond Iron Works, Inc.
*Good Roads Machinery Corp.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Norberg Mfg. Co.
*Pioneer Gravel Equip. Mfg. Co.
*Portable Machy. Corp.
Productive Equip. Corp.
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Simplicity Engr. Co.
Smith Engr. Works
Sturtevant Mill Co.
*Tyler Co., W. S.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Scrubbers
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Separators (Air) (See Air Separators)

Sheaves
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Chain Belt Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Link-Belt Co.
*Jeffrey Mfg. Co.
McLanahan and Stone Corp.

Shovels (Electric, Internal-Combustion and Steam)
*Bucyrus-Erie Co.
*Harnischfeger Corp.
*Koehring Co.
Lima Loco. Works, Inc.
*Link-Belt Co.
Michigan Power Shovel Co.
Northwest Engr. Co.
Thew Shovel Co.

Siding (Steel)
Carnegie-Illinois Steel Corp.

Silos
*Chain Belt Co.
*Chicago Bridge & Iron Co.

Skip Hoists and Skips
*Allis Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Sleeves Dredge
*Cincinnati Rubber Mfg. Co.

Speed Reduction Units
*Chain Belt Co.
*General Electric Co.
Iowa Mfg. Co.
*Link-Belt Co.

Spirals (Lowering)
Holmes & Bros., Inc., Robt.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Stabilized Road Mix
*Calcium Chloride Association

Stackers
*Jeffrey Mfg. Co.
United Welding Co.

Starters (Automatic, Motor)
*General Electric Co.

Steel (Alloy)
(See Alloys—Steel)

Steel (Bars, Shapes, Plates, Etc.)
Carnegie-Illinois Steel Corp.

Steel Grating (See Grating, Steel)

Steel Plate Construction
Carnegie-Illinois Steel Corp.
*Chicago Bridge & Iron Co.
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
Manganese Steel Forge Co.
*Portable Machy. Corp.

Stone Grapples
Owen Bucket Co.

Storage Equipment
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Chicago Bridge & Iron Co.
*Erie Steel Construction Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Sweeping Systems
Allen-Sherman-Hoff Co.

Switchboards (Electric)
*General Electric Co.

Switches (Electric)
*General Electric Co.
I-T-E Circuit Breaker Co.

Switches (Safety)
*General Electric Co.
I-T-E Circuit Breaker Co.

Tanks
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.
*Traylor Engr. & Mfg. Co.
United Welding Co.

Tanks (Elevated Steel)
*Chicago Bridge & Iron Co.

Tanks (Sand-Settling)
Bartlett & Snow Co., C. O.
*Chicago Bridge & Iron Co.
*Good Roads Machinery Corp.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Pioneer Gravel Equip. Mfg. Co.
Smith Engr. Works

Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

Thickeners (Slurry)
*Hardinge Co.

Tire Repair Materials
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Track Shifters
*Nordberg Mfg. Co.

Tractors
*Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.

Trailers
General Motors Corp.

Trailers (Motor Truck)
Hug Company

Tramways (Aerial)
*American Steel & Wire Co.
*Roebling's Sons Co., John A.

Transformers
*Allis-Chalmers Mfg. Co.
*General Electric Co.

Transmission Belting (See Belting)

Transmission Machinery
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trippers
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Good Roads Machinery Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Chain Belt Co.
*Jaeger Machine Co.

Trucks and Trailers (See Motor Trucks)

Trucks (Hand)
Howe Scale Co.

Tube-Mills (See Mills—Ball, Tube, etc.)

Tubes (For Tire Casings)
Goodyear Tire & Rubber Co.

Turbines
Smith Co., S. Morgan

Underground Loaders
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.

Unit Heaters
*General Electric Co.

Unloaders (Box Car)
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.

Valves (Air)
Worthington Pump & Machy. Corp.

Valves (Pump)
*Cincinnati Rubber Mfg. Co.
Taylor Forge & Pipe Works

Variable Speed Reducers or Transmissions
*Chain Belt Co.
*Link-Belt Co.

Vibrating Screen Plate
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
*Jeffrey Mfg. Co.
*Tyler Co., W. S.

Wagons (Dump)
*Koehring Co.
Le Tourneau, Inc., R. G.

Washers (Sand, Gravel and Stone)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Diamond Iron Works, Inc.
*Eagle Iron Works
*Good Roads Machinery Corp.
Haiss Mfg. Co., Geo.
*Hardinge Co.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Mach. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Pioneer Gravel Equip. Mfg. Co.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
Universal Crusher Co.
Universal Road Machy. Co.

Weighing Equipment (Automatic)
*Blaw-Knox Co.
*Erie Steel Construction Co.
*Fuller Co.
Howe Scale Co.
*Jaeger Machine Co.
Merrick Scale Mfg. Co.
Schaffer Poidometer Co.

Welding Bars, Wedge and Applicator (Nickel - Manganese Steel)
Stulz-Sickles Co.

Welding and Cutting Equipment
*General Electric Co.
Smith Company, S. Morgan
Stulz-Sickles Co.

Welding Rods
American Manganese Steel Co.
Stulz-Sickles Co.

Welding Service
*Rock Bit Sales & Service, Inc.
Smith Co., S. Morgan
Stulz-Sickles Co.
United Welding Co.

Welding Supplies
American Manganese Steel Co.
*American Steel & Wire Co.
*General Electric Co.
*Harnischfeger Corp.
Manganese Steel Forge Co.
*Roeblings Sons Co., John A.
Stulz-Sickles Co.
United Welding Co.

Well Drills (See Drills—Well)

*See also information in the 1937 Pit and Quarry HANDBOOK.

Fine Screening by THE Leahy

THESE PLANTS PROFIT BY THE FINE SCREENING OF LEAHY SCREENS ON FINE SCREENING JOBS

The new Leahy Heavy Duty Vibrating Screen is unequalled for screening at fine meshes. Leahy patented differential vibration assures utmost economy of operation, maintenance and installation costs.

Available in many types and sizes, for either belt or motor drive, open type, totally enclosed dust-proof type, single or double surface.

NO-BLIND SCREEN

Specially designed for fine screening.
Built extra sturdy.

We also manufacture Sand Classifiers and the Deister Overstrom Diagonal Deck Washing Table for sand and gravel, which produces a premium product at minimum cost—handling from 18 to 40 tons per hour.

Write for Bulletins

THE ORIGINAL
DEISTER CONCENTRATOR COMPANY
Incorporated 1906
911 Glasgow Ave. Ft. Wayne, Ind.

FINE GRINDING

Costs Less with Williams Roller Mills

More Efficient Separator
Instantly changeable from 70%—100 mesh to 99.9%—325 mesh

Ball Bearing Operation
Smooth running—Trouble free

Stronger Construction
Steel Castings—Boiler Plate
Separator Top

Dries and Grinds Simultaneously
A more desirable Finished Product always

Whatever the fine grinding job—LIMESTONE, CLAY, LIME, COAL, TALC, GYPSUM, or any non-metallic mineral—there's a Williams Improved Roller Mill with Super Separator to fit your particular requirements
(Built in Six Popular Sizes)

Repeat orders from many of America's Largest Firms testify to Williams Mills' Superiority—Write us for Descriptive information.

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802 St. Louis Ave., St. Louis, Mo.

Chicago 37 West Van Buren St. | New York 15 Park Row | San Francisco 326 Rialto Bldg.

WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST. LOUIS, U.S.A. THE TRADE MARK REG. U.S. PAT. OFF.

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

Williams

PATENT CRUSHERS GRINDERS SHREDDERS

Hammer Crushers
Air Separators
Vibrating Screens
Impact Mills

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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Wheels (Car)
American Manganese Steel Co.
*Eagle Iron Works
Iowa Mfg. Co.

Wheel Rims. See Rims—Wheel

Winches and Capstans
*Chain Belt Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Wire and Cable (Electric)
*American Steel & Wire Co.
*General Electric Co.
*Roebling's Sons Co., John A.

Wire Cloth
Audubon Wire Cloth Corp.
Cleveland Wire Cloth & Mfg. Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
National Wire Cloth Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
Tyler Co., W. S.

Wire Rope
*American Steel & Wire Co.
*Hazard Wire Rope Division of the American Chain & Cable Co., Inc.
*Leschen & Sons Rope Co., A. Licensees under Preformed Wire Rope Patents
*Roebling's Sons Co., John A.
Union Wire Rope Co.
Williamsport Wire Rope Co.

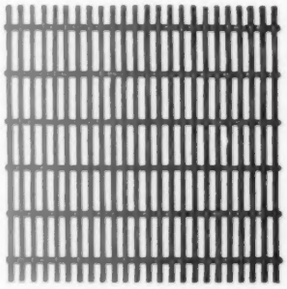
Wire Rope Fittings
*American Steel & Wire Co.
Broderick & Bascom Rope Co.
*Hazard Wire Rope Division of the American Chain & Cable Co., Inc.
*Leschen & Sons Wire Rope Co., A.
Licensees under Preformed Wire Rope Patents
Page Engr. Co.
*Roebling's Sons Co., John A.
Union Wire Rope Co.
Williamsport Wire Rope Co.

Wire Rope Slings
*American Steel & Wire Co.
Broderick & Bascom Rope Co.
*Hazard Wire Rope Division of the American Chain & Cable Co., Inc.
*Leschen & Sons Rope Co., A. Licensees under Preformed Wire Rope Patents
*Roebling's Sons Co., John A.
Union Wire Rope Co.
Williamsport Wire Rope Co.

Wire (Welding)
American Manganese Steel Co.
*American Steel & Wire Co.
Manganese Steel Forge Co.
*Roebling's Sons Co., John A.

Worm Gears (See Gears and Pinions)

* See also information in the 1937 Pit and Quarry HANDBOOK.



Rolled Slot

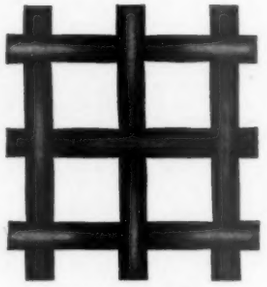
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

SYMONS
CRUSHERS • SCREENS

FINER PRODUCT
GREATER CAPACITY
LOWER CRUSHING COST

These advantages have made Symons Cones first among reduction crushers.

SIZES CLOSER
SAVES HEADROOM
ACTION IS POSITIVE

The trend is definitely toward level screening. Again Symons leads the way!

NORDBERG MFG. CO., MILWAUKEE WISCONSIN

In Philadelphia it's the

HOTEL PHILADELPHIAN
FORMERLY HOTEL PENNSYLVANIA
600 ROOMS WITH BATH FROM $2.50 UP
39th and CHESTNUT STREETS
PHILADELPHIA, PENNA.

Only the **SELECTRO** by JIGGER
GIVES YOU A VIBRATING SCREEN WITH—

1. Selective Vibration, Throw
2. Full Tilting
3. Full Circle Throw
4. Oil—Not Grease—Lubrication
5. Ruggedness, Low Operating Costs

Send for new data book on screening

Write for More Information

PRODUCTIVE EQUIPMENT CORP.
4600 S. Kedzie Ave. Chicago, Ill.

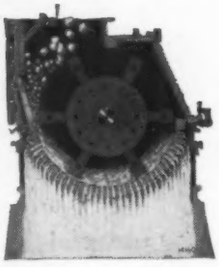
Advertise your wants and surplus equipment in

Pit and Quarry
with which is consolidated
CEMENT-MILL & QUARRY

Reduce Material Enlarge Profits

WITH

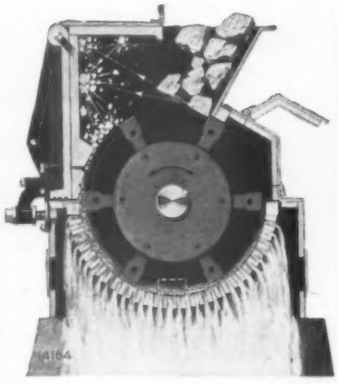
Jeffrey Pulverizers and Crushers



Type A — for average requirements and moderate capacities in the reduction of limestone, gypsum, coal, shale and similar material.

●

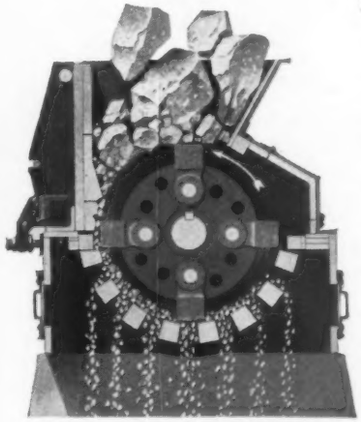
Type B—for finer reduction, break-down and heavier work. Jeffrey swing hammer pulverizers have the unique feature of reducing through a series of distinct steps (see illustration), the greater part of the reduction being done in the upper chamber before the material reaches the screen bars. This method results in a substantial power saving, less maintenance, increased capacity and more uniform product.



●

Miracle hammer crushers—designed for the reduction of large pieces and large capacities of limestone, shale, slag and cement rock. Will take steam shovel size limestone, reducing it into pieces 1", 2", 3" or 4" and under, in one operation. Here again a saving is made, for this machine does the work of two or more crushers of other types.

Jeffrey miracle hammer crushers are supplied with either heavy cast iron frames or with armorplate steel with manganese steel liners. For a product of more than ordinary uniformity, this unit can be furnished with an adjustable screen cage.



Jeffrey reduction units will give you many years of dependable service. Many satisfied users say that they have found them superior to any on the market today. With 44 years' experience . . . we are in a position to select the right machine to reduce your operating costs and to improve your product.

1877 60 Years 1937

The Jeffrey Manufacturing Company

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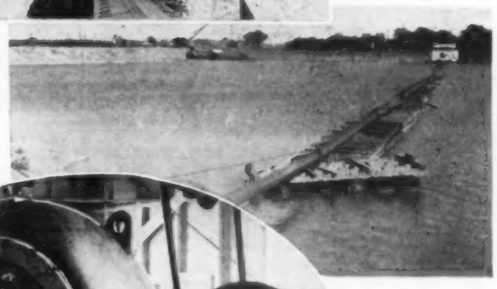
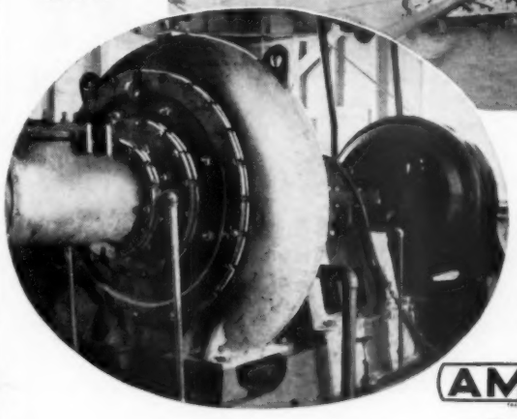
Buffalo	Scranton, Pa.	Chicago	Denver
Philadelphia	Cincinnati	Huntington, W. Va.	Dallas
Pittsburgh	Cleveland	Milwaukee	Salt Lake City
			Birmingham

Jeffrey Manufacturing Co., Ltd. of Canada
Head Office and Works: Montreal—Branch Offices: Toronto, Calgary, London

The Plant

The Dredge Line





The AMSCO *Pump!*

AT THE SAXET SAND AND GRAVEL COMPANY

The modernized plant of the Saxet Sand & Gravel Company at Victoria, Texas, is a typical AMSCO "COUNTERFLOW" Pump operation.

They now use a 12-inch AMSCO "COUNTERFLOW" unit for pumping from their deposit to their washing plant, handling from 125 to 175 tons per hour through 1,740 feet of dredge pipe, against a 22 foot vertical head.

AMSCO service for sand and gravel producers is complete including the furnishing of pumps, flap valves, pipe fittings and dredge cutter heads, plus competent suggestions on design and construction of dredges, ladders, piping and other operating equipments.

AMERICAN MANGANESE STEEL COMPANY

Division of The American Brake Shoe & Foundry Company

396 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities

AMSCO

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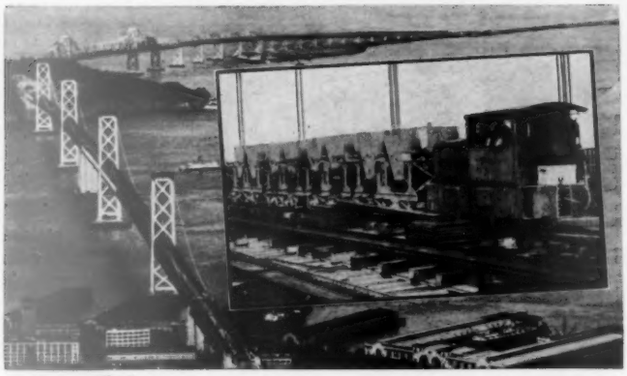


When WHITCOMB LOCOMOTIVES

Performed High Above

SAN FRANCISCO BAY

Naturally, the men who designed and built the great San Francisco-Oakland Bridge used the most effective methods and equipment to be had. The photograph shows one of a fleet of Whitcomb Locomotives hauling concrete from the loading hopper to the paving operations on the bridge.

On haulage jobs, large and small—in mine, quarry, construction work, or factory yard, Whitcomb Locomotives work without waste—haul more tons per dollar in less time. Backed by two great names—Whitcomb and Baldwin—they give you assurance of dependable, uninterrupted service.

The extensive line includes a type and size of Locomotive to suit your needs. Let our engineers survey your haulage problem, and estimate the savings you can make with Whitcomb equipment.

CHOOSE YOUR POWER

Gasoline or Diesel Mechanical Drive
Gasoline or Diesel Electric Drive
Electric Storage Battery
Electric Trolley
Combination Trolley—Storage Battery

THE WHITCOMB LOCOMOTIVE COMPANY

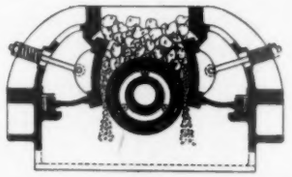
Plant at Rochelle, Illinois

Subsidiary of The Baldwin Locomotive Works. All sales made by The Baldwin Locomotive Works, Paschall Station Post Office, Philadelphia, Penna.

LIME PRODUCERS EQUIPMENT

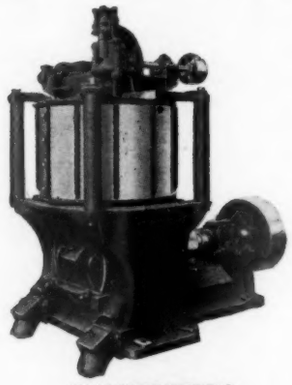
Engineered and designed especially for production of lime products and backed with 46 years of experience—

BONNOT



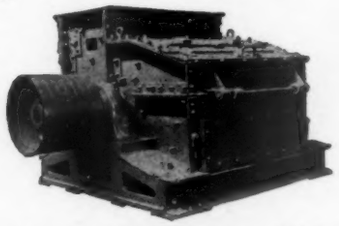
REDUCTION CRUSHERS

An entirely new principle of crushing, even distribution of wear, long life manganese wearing parts, simple, rugged, and economical in power.



PULVERIZERS

For grinding hydrated lime, quicklime, limestone, etc., wearing parts few in number and easily replaced—two sizes 18 and 36 inch diameter rings.



Ring Roll or Hammer Mills

Either ring roll or swing hammer type mills for high speed grinding of limestone, and other materials. Roller bearings, tramp iron protection, renewable liners.

ROTARY KILNS-DRYERS

THE BONNOT CO.

CANTON, OHIO

— Since 1891 —

New York Office: 30 Church Street

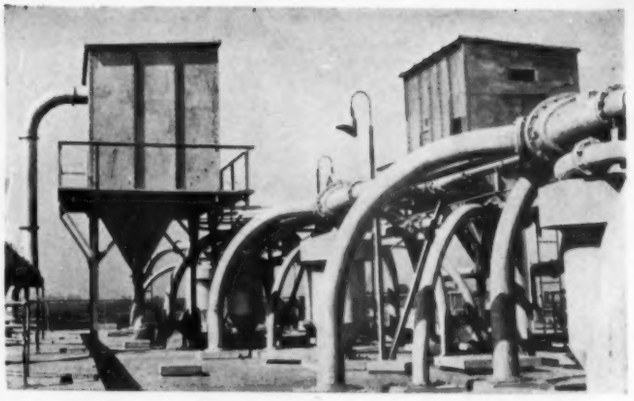
Buyer's Directory

WELDING ✓

Big jobs—to your designs and specifications, or to ours! Expert Welding—born of experience in welding huge pieces for the highest-powered units of their kind ever built. Smith is the answer to your heavy welding problems. Write for Bulletin.

by

S MORGAN SMITH CO.
York, Pa.



Two Sly Dust Filters on roof of cement silos.

Sly DUST Experience "HOLDS THE KEY" TO THE MOST COMPLETE AND ECONOMICAL SOLUTION OF DUST PROBLEMS.

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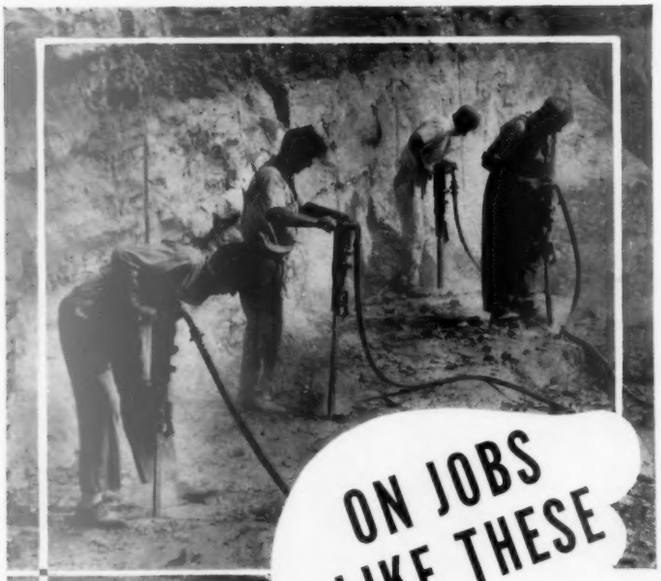

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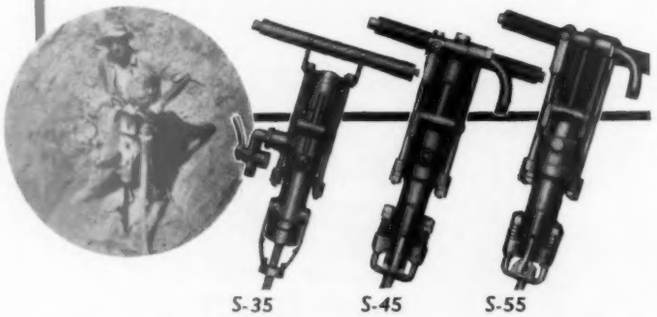

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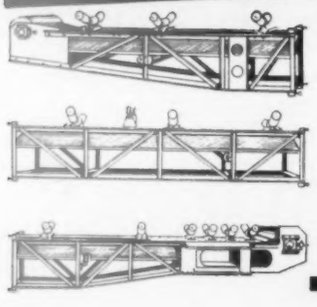

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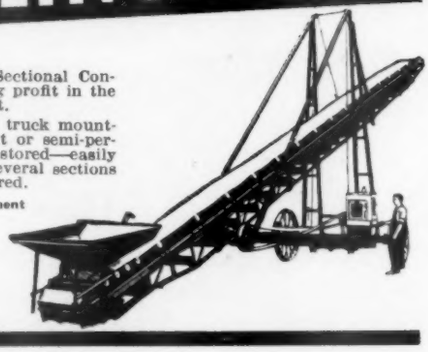

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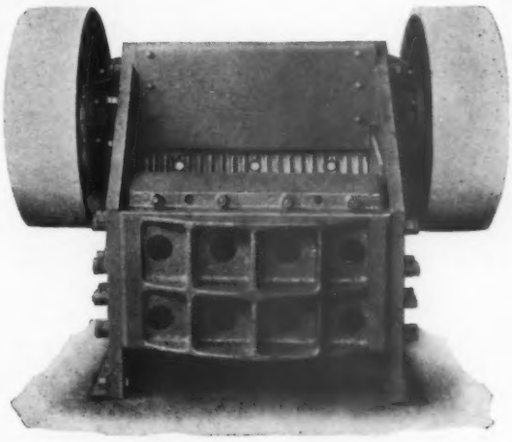

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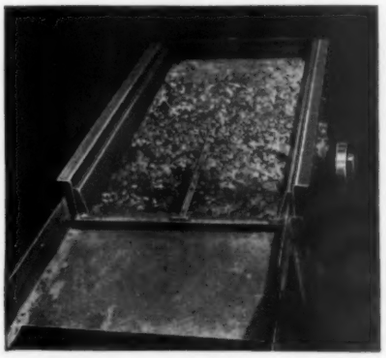

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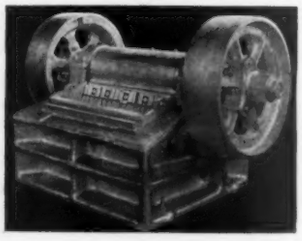

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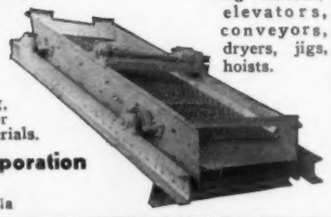

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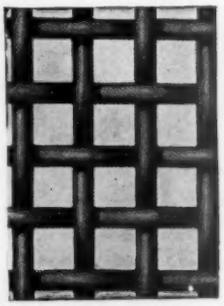

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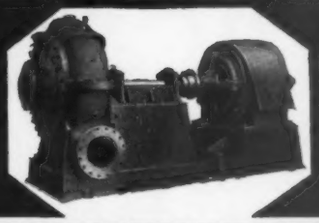

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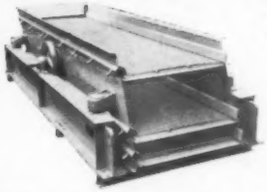

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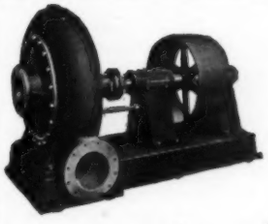

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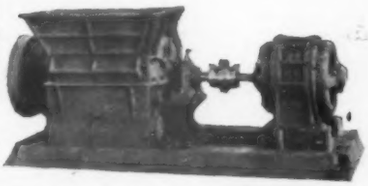

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1—Allis Chalmers size No. 5 Gates gyratory, No. 5331, openings 10″x38″.
2—McCully No. 3 gyratory crushers.
1—18″x36″ Farrel Bacon jaw crusher, size No. 12-B with 75 HP motor.
1—Climax No. 2½ jaw crusher, 10″x 20″, No. 2637.
1—Climax No. 2 jaw crusher, No. 1410, 9″x16″.
1—Allis Chalmers smooth type crushing rolls, size 42″x 16″.

DERRICKS
1—25 ton Clyde, all steel stiff leg derrick with 50′ boom, 30′ mast, legs and sills in proportion, 12′ dia. bullwheel, for hook work or clamshell operation.
1—15 ton Clyde, all steel stiff leg derrick, 50′ boom, duplicate of above.
1—15 ton Dobbie, all steel stiff leg derrick, 100′ boom, 50′ mast, legs and sills in proportion, 16′ dia. bullwheel, for hook work or clamshell operation.
1—15 ton Clyde, all steel, "A" frame, barge derrick with 50′ boom, 30′ mast, 12′ dia. bullwheel, for hook work or bucket operation.
2—10 ton steel stiff leg derricks, with 80′ boom, 40′ mast, legs and sills, 16′ dia. bullwheel.
1—American and 1—Insley.
1—7½ ton Vierling, all steel stiff leg derrick with 125′ boom, 40′ mast, 12′ dia. bullwheel, for hook work only.

DERRICKS (GUY)
10—American, all steel guy derricks with 115′ mast, 100′ boom, with bullwheel, for hook work or clamshell; 2—20 ton, 8—15 ton.
4—Bedford 6 ton cap., all steel guy derricks, with 90′ mast, 80′ boom, with bullwheel, for hook work or clamshell.

LOADERS
1—Barber-Greene model 42-A.
1—Hains model A.

LOCOMOTIVES
32—Gasoline locomotives, from 20-ton to 2-ton, std. ga. 36″ and 24″ ga.
1—Porter steam saddle tank locomotive, 24-ton, cyls. 12″x16″; std. ga. No. 5093.

SHOVELS
1—Lorain 75-B 1¼ yd. shovel No. 4891 with pull shovel attachment.
1—Osgood hvy. duty ser. No. 2069, 1 yd. gas. shovel.

EQUIPMENT CORPORATION OF AMERICA

PHILADELPHIA—P. O. Box 5471, Kingsessing Sta. Phone Granite 7600
CHICAGO—1160 S. Washtenaw Ave. Phone Nevada 2400
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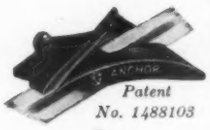
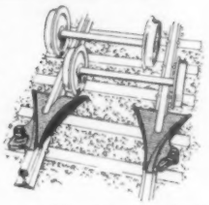


To put derailed cars and locomotives back on the track. Easily handled by one man. Patented locking cam holds Rerailer in position.

"Anchor" Rerailers

Retracks wheels from both sides. Carry a pair on every locomotive, and you are always prepared. They save you time, labor and money.



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Reynoldsville, Penna.

Diesel Power Plant

1—750 HP Busch-Sulzer Diesel Oil Engine direct connected to 500 KW Generator, 3 ph., 60 cy., 2300 volt. Complete with switchboard and electrical and mechanical auxiliary.

Locomotive Cranes
1—15-20 ton Link-Belt. 50 ft. boom.
1—20 ton Ohio. 50 ft. boom.
1—20 ton Browning No. 8. 50 ft. boom.
1—30 ton Ohio. 50 ft. boom.
1—40 ton Brownhoist. 60 ft. boom.
1—50 ton Wrecker type crane. 50 ft. and 90 ft. booms.

Saddle Tank Locomotives
1—25 ton Baldwin. Std. Ga.
1—32 ton American. Std. Ga.
1—40 ton Baldwin. Std. Ga.
1—40 ton geared Heisler. Std. Ga.
3—Vulcan. 13x20 yds. Std. Ga.
1—18 ton gas-electric. Std. Ga.

SPECIAL!
500 ALL-STEEL 50-TON BATTLESHIP HOPPER CARS

25—40 ton steel u/f flats.
20—50 ton steel u/f flats.
50—30 ton steel u/f flats.
200—30 ton steel u/f box cars.
75—30 ton steel u/f stock cars.
75—50 ton all-steel gons.

Narrow Gauge Dump Cars and Locomotives
Standard Gauge Dump Cars and Switch Engines

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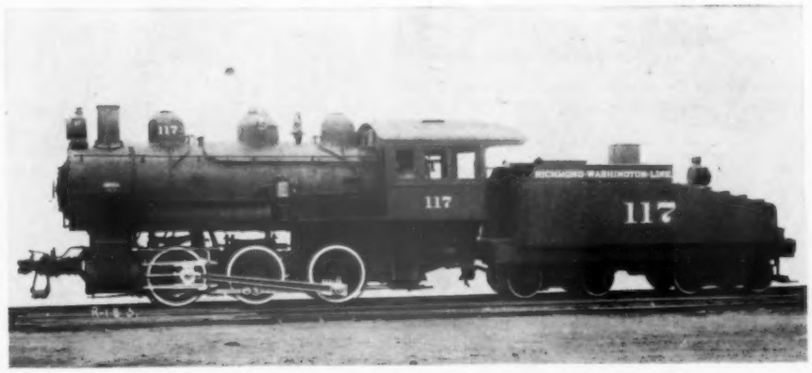

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Five Switching Locomotives as above

Ready for Immediate delivery—Attractive price for quick sale
Quotations on Request

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CRUSHERS

GYRATORY: No. 30 (30″) Kennedy. 42″ McCully with 80% brand new parts. 36″ Superior McCully, slightly used. 20″ Superior McCully reduced to 16″. Nos. 12, 10, 9, 8, 7½, 6, 5, 4, 3 Gates K, N & D, Tel. No. 5 & 6 Traylor 12 T. Reduction Ty: 6 & 10″ McCully, 7″ Newhouse, Nos. 37 & 49 Kennedy. Symons 36″ Disc.
ROLLS: 36x16, 40x15, 52x24 Allis-Chalmers Anaconda Ty. Also 26x20 Diamond & others.
JAW: 84x66 Superior 52x72 & 30x42 Buchanan, 36x48 Blake, 24x72 Traylor, 24x36 Farrel & Worthington, 10x40 Good Roads, 9x36 & 15x36 Iowa, 8x20 Bakstad 3-jaw, & many smaller.
HAMMERMILLS: Nos. 3, 5 & 9 Williams, 5040 Dixie Mogul, 36x24 Jeffrey, and others.
CONE: 4 ft. Symons, 5½ ft. Symons.
MILLS: Raymond 5-roll Low-Side Kennedy 3′x6′ Ball, Kent 34″x7″ and others.

Miscellaneous Items
CONVEYOR: 30″x463′ with Merrick Auto. Scale.
CRUSHING PLANTS (Portable): Nos. 60 & 65 Diamond and 300-W Pioneer Washing Plant.
CARS: 4 & 5 Yd. 36″ Ga. Koppel & Western.
DERRICKS: 4 complete for bucket handling.
DRYER: 5′x36′ Bartlett & Snow, revolving.
DRAGLINE: Link-Belt K-55, Diesel, 75′ Bm.
DRAG SCRAPER UNITS: 1, 3 & 4 Yd. complete.
PUMP: 10″ AMSCO ty. M Dredging.
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Misc. items in plants being dismantled available at very low prices.

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CARBON PAPERS
TYPEWRITER RIBBONS
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10x18 Reliance Fine Crusher, Like New.
Gyratory Crushers 5K, 6K, 8K Allis Chalmers, 12" Traylor Bulldog.
Jaw Crushers 6x20 Sturtevant & Farrel—Others up to 66x84.
Crushing Rolls 54x20, 42x24, 42x16, 36x16, 30x14, 24x14.
Gruendler XXB Mill with Air Separator.
No. 32 Raymond Imp. with Air Separator.
Rotary Dryers 44"x25'0", 5'9"x35'0", 4'6"x30'0".
2—4'x10'—2 deck Robins Gyrex Screens.
¾ and 1¼ yd. Marion A.C. Electric Shovels.
Tube Mills 8'x26', 5½'x20' and 5'x22'.
Austin Trencher, Style 100.
Gallon EZ lift Motor Grader.
Crushing Plant, Portable, Aurora No. 1, 10x16 Crusher, elev. and screen, with or without 20HP steam engine.
No. 300W Pioneer Screening, Crushing & Washing Plant.
60 ft. Guy Derrick with Gas Hoist.

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875 Sixth Avenue New York, N. Y.

SLIP RING MOTORS
40 HP. 900 RPM. 3/60/440 volt General Elec.
50 HP. 900 RPM. 3/60/2300 volt Western Elec.
75 HP. 900 RPM. 3/60/220 volt Westinghouse
100 HP. 720 RPM. 3/60/220 volt Westinghouse
400 HP. 600 RPM. 3/60/440 volt General Elec.

AC GENERATORS
37 KVA. 1800, 3/60/220 Ideal—belted exciter.
50 KVA. 1200, 3/60/220 Bullock—dir. con. exciter
100 KW. 600, 3/60/440 Western Electric

AIR COMPRESSOR
599 CFM. 16 & 10x14 Ingersoll-Rand two stage

OIL ENGINE
10 HP. 450 RPM. Fairbanks-Morse style H

GASOLINE GENERATOR
6 KW. 110 Volt DC generator—12 HP. LeRoie engine

STEAM GENERATOR
312 KVA. 3/60/480 volt Allis-Chalmers Corliss

CENTRIFUGAL PUMPS
1½" 240 GPM. 50' Fairbanks-Morse motor driven
5" 1000 GPM. 170' American 2 stage belted type

ROCKFORD ELECTRIC EQUIPMENT CO.
726 South Wyman St. Rockford, Illinois

Selecto 3-deck 3'x8' Vibrating Screen.
5 Hummer Elec. Vibr. Screens, 1 & 2 deck.
Tyler Motor Generator, 8KVA, 15 cycle.
Conveyor Idlers & Pulleys, 16" to 30" Belt.
Trough Idlers, ball-bearing, for 22" Belt.
Belt Conveyor Trippers, from 16" to 30".
Cont. Belt Elevator, 60' high, 36" Buckets.
Clamshell Material Buckets, 1¼ to 2 yards.
Jeffrey Comb. Jaw Crusher & Hammermill.
Farrel Jaw Crusher, 42"x40", type E.
Kennedy 37 Gyratory Crusher, 50 HP syn.
Acme 10"x42" Jaw Crusher.
Centrif. Elec. Pump, 500 GPM, 300' Head.
Goulds Centrif. Electric Pump, 1000 GPM.
F-M Centr. Belted Pump, 375 g., 77' Head.
Morris 8" standard Dredge Pump, no power.
Bag Filling & Weighing Machine ½ HP elec.
Johnston 50 HP Loco. Boiler, 125 lb. skids.
2 Gasoline Locomotives 36" g., 4 & 6 ton.
Mundy 2-drum Hoist, 25 HP slipring motor.
Mundy 2-drum Hoist, 15 HP LeRoi Gas Eng.
Gardner-Denver Portable Compressor, 160'.
Schramm Compressor, 120' 15 HP electric.

G. A. Unverzagt, 15 Park Row, New York City

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We
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Electric Motors, Pumps, Air Compressors Big Bargains. All Standard Makes.

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BARGAINS IN AIR EQUIPMENT

1—Sullivan 110' Compressor #14628 on 4 steel wheels $750.00
1—Sullivan 160' Compressor # 1783 mounted on steel wheels 400.00
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1—Sullivan 220' Compressor #9216 on 4 wheels 600.00
1—Sullivan 220' Compressor #13796 on 4 steel wheels, with clutch 750.00
1—Ingersoll-Rand 310' Portable Compressor #PP-69370 on 4 steel wheels 500.00

The machines are in good operating condition, ready to go to work. We offer them a sacrifice prices for quick sale, subject to prior disposition and your inspection.

O. B. AVERY COMPANY
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Phone—Hiland 1810

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3—Standard Gauge 10x16 Steam Locomotives.
1—Plymouth Gasoline Locomotive 5-ton standard gauge.
Several Standard Gauge Flat cars.
1—10-ton cable-way with Flory 10x12 Engine.
1—350 Ft. Ingersoll Rand Electric Compressor complete with motor.
1—72" Return Tubular 160 hp boiler.

J. LEOPOLD & COMPANY, INC.
60 E. 42nd St., New York, N. Y.

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SCREENING PLANT WITH HOPPERS

Heavy Steel Structure 25'x58'x70' high
Shaker Screens 5 high—2½" to ¼" screens
With distribution chutes to:—
6—Wood Lined Hoppers.
Equipped for both truck and car loading.

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GOOD USED EQUIPMENT

176'—250'—360'—1000'—1560' Air Compressors, belted and motor drive.
¾, 1, 1½, 2-yd., 1 and 2 line buckets.
1000'—3" high pressure hose with fittings.
Send for our latest catalogue describing complete Quarry and Contractor's Equipment.

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Erie Type B Combination Shovel & Crane—40' lattice type boom—very good operating condition.
Plymouth 8 Ton,36" ga. gasoline loco.,geared No.2667.
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Lidgerwood Three Dum Skeleton Hoist, cut gears, No. 45909, size 10x12.
O.&S.8 wheel loco. crane, 22 ton, 50' boom,D.D. Cheap.
Lorain 75-A combination shovel & dragline, 4000 series—bargain.
McKiernan-Terry No. 6 Hammer $250.00
4—Lockwood two line 40 cu. ft. concrete buckets.

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HOISTS STEAM

1—Mead-Morrison 8¼ x 10 double drum, with ASME boiler.
2—Mead-Morrison 7 x 10 double drum, with ASME boiler.
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Oil Engines, Generators, Crushers, Contractors Equipment.

J. D. ANDERSON MACHINERY CO.
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REAL BARGAINS

1¼ yd. Moore Speeder Shovel—4 yrs. old.
¾ & 1½ yd. Page Dragline Buckets.
60 HP New Diesel Electric Hoist.
New—Used Steam Locomotives—9-75 tons.
Motors—Generators and Motor Generator Sets.
2—40 HP DD Electric Driven Hoisting Engines.
145 HP GE 2200 volt Syn. Motor.
200 HP Busch Sulzer Diesel Generator Set.
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FOR SALE

1—10" Steel hull dredge complete with exception of power—$5,000.00.
1—Switcher type locomotive for gravel plant or similar work—$1,000.00.
1—1½ cu. yd. clam shell bucket—$250.00.

Mississippi Sand & Gravel Co., Inc.
KOLOLA SPRINGS, MISSISSIPPI

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FAIRBANK — HOWE — COLUMBIA
Rebuilt Scales — Guaranteed
General Repairing

COLUMBIA SCALE CO.
2439 N. Crawford Ave., Chicago, Ill.

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Koehring, High Lift, ¾ yard Gas Shovel. Recently overhauled. Brand new engine. Now operating. Price $3,200.00.

VICTOR OOLITIC STONE CO.
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COMPRESSOR

600' Ingersoll Rand Two Stage. Good as new. Complete with 100 HP., G.E. Slip Ring 30/60 440 v. Motor and Equipment. Large Air Receiver. Inspection on foundation. Price: $2,000.00 f.o.b. Rochester, N. Y.

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ELEVATORS AND SCREENS
1—36x42 FARREL 29-B Jaw Crusher.
1—24x36 FARREL 14-B Jaw Crusher.
Champion Jaw Crushers — Nos. 4, 4½, 5 and 6.

JOHNSON AND HOEHLER, INC.
Lansdowne, Penna.

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2—½ yd. full revolve gasoline crawler Shovels—overhauled and with crane booms if required. IMMEDIATE SHIPMENT.

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1—160 ft. Gardner-Denver
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Advertise Your
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AIR COMPRESSORS
110, 220 & 310 Ft. I.R. Portables.
4—220 ft. I.R. Portable Diesels.
2—355 ft. I.R. 12x10 Class ER1, Bltd.
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676 ft. I.R. XCB 15x9¼x12, Belted.
2—676 ft. Chgo. Pneu. Benz Diesels.

CRANES & SHOVELS
15 ton Northwest Class M, 50 ft. Boom.
18 ton P&H Class 700 Crane.
1½ yd. Thew Diesel Shovel.
¾ yd. and 1¼ yd. Marion Elec. Shovels.
1½ yd. Marion 37 Steamer.
2 Erie B2 1 yd. Steam Shovels.
25 ton Browning Locomotive Crane.

HOISTING ENGINES
40 HP Lambert Double Drum, Electric.
75 HP Sauerman Gas Scraper.
60-80 HP Lambert Elec. D.D. & Swinger.
7x10, 8x12x10x12 Steam Hoists.

LOCOMOTIVES
40 ton Baldwin Std. Ga. Saddle Tank.
10 ton Milwaukee Gas, Std. Ga.
6—12 & 14 ton Vulcan, 36 in. ga. Gas.
3—5 & 6 ton Plymouth, 36 in. ga. Gas.

ELECTRIC LOCOMOTIVES
3—6 Ton G. E. 30 in. ga. Trolley.
6—3 to 6 Ton Mancha 24 ga. S. Battery.
4—5 to 8 Ton Whitcomb 36 ga. S. Battery.

CONVEYOR EQUIPMENT
500 ft. 24 in., 5 ply Belt.
750 ft. 18 in., 4 ply Belt.
18 in., 24 in., 30 in., 36 in. Idlers.
50 ft. Portable 22 in. conveyor.

DUMP CARS
7 Koppel, 3 yd. V, 36 in. ga.
28 Koppel, 1¾ yd. V, 36 in. ga.
46 Koppel, 1 & 1½ yd. V, 24 in. ga.

STEEL DERRICKS
2 American 15 ton, 100 ft. Stiff Leg.
3 Terry, 90 ft. Boom, Guy Type.

PORTABLE TRACK
10 Miles 20 lb., 24 in. gauge.
3000 ft. 30 lb., 36 in. ga.

JAW CRUSHERS
9x16 Champion Steel Plate Frame.
8x16 Western and Elevator on Wheels.
5x10 and 9x16 Sturtevant.
15x24 Universal.
10x20 Champion.
12x16 Traylor, late type.
15x30 Traylor, new 1936.
11x12 New England.
36x10 Farrell, type B.
18x36 and 24x36 Farrell B.
14x36 and 16x10 Acme Steel Frame.
24x36 Worthington Superior.
48x72 Buchanan type C.

GYRATORY & CONE CRUSHERS
7 Inch Newhouse & 60 HP Motor.
18-24-36-48 Symons Disc Type.
Gates No. 3 with TZ Head.
No. 3 Austin, 8½x24 opening.
No. 5 Telsmith.
36 Inch Superior McCully.
8 In. and 10 In. Superior McCully.
No. 6 Traylor, 12 Inch Opening.
No. 37 and 49 Kennedy.
2 Austin No. 5.
15 Gates K Nos. 4, 5, 6, 7½ & 8.

ROLLS & PULVERIZERS
24x26 Link Belt coal crusher.
Jeffrey No. 3 Crusher—Pulverizer.
42 Inch Fuller Lehigh Pulverizers.
No. 3 Williams Helix Seal Impact Mill.
Raymond No. 0 Pulverizer.
American No. 36 Hammermill.
36x16 Kennedy Double Rolls.
36x16 Worthington Single Rolls.
34x20 Jeffrey Double Rolls.
36x16 Traylor Rolls.

SCREENS
6 Hummer 4x5, 1 & 2 Deck.
4x8 Allis Chalmers, 2 Deck.
3x5 Hummer 33, 2 Deck.
70x102 Traylor FB4, 2 Deck.
2 Rotex 20x87, 3 Deck.
2 Universal, 3x8, Single Deck.

SAND PLANT
1 Pioneer Model 300W Portable.

COMPLETE PLANTS BOUGHT & SOLD

R. C. Stanhope, Inc.
875 Sixth Ave. New York, N. Y.

SHOVELS
Bucyrus-Erie 120-B Electric 4-yd. capacity, New 1935.

General one-half yard capacity gas.
Northwest Model 105—Crane, one yard capacity 40′ boom, one yard clamshell.
Byers ½ yard capacity with crane boom, shovel attachments and back hoe.

LOCOMOTIVES
3—Heisler 42 ton and 63 ton standard gauge and 42″ gauge 1933.
1—Vulcan 35 ton steam, air brakes 42″ gauge 1932.
1—Vulcan 24 ton air brakes 42″ gauge 1932.
1—Vulcan 25 ton steam standard gauge 1932.
2—Vulcan 21 ton steam 36″ gauge.
1—Mancha storage battery, 6 ton 36″ gauge.

CARS
10—10 yard and 8—12 yard all steel 36″ gauge Western air dump, air brakes, drop type doors, built 1933.
6—30 yd. Clark all-steel air dump, standard gauge, drop type doors.
10—4 yard Western 36″ gauge two-way hand dump, steel underframe.

BOILER
1—New 40 H.P. Locomotive type, National Board 190 lbs. pressure, NEW.

BUCKETS
1—Hayward three yd. orange peel.
1—Blaw-Knox 3 yd. clamshell for dredge work.

COMPRESSOR
1—Ingersoll Rand Motor Compressor, multi-cylinder, 2 stage air cooled 50 H.P. G.E. Motor attached 284 cubic feet @ 100 lbs. Complete.

PUMPS
2—Centrifugal with 75 and 100 H.P. A.C. motors direct coupled, capacity 1000 g.p.m. @ 180 & 225 ft.

CLASSIFIERS
4—Dorr-Duplex rake and bowl classifiers with or without 18′ Dia. Bowl.

CRUSHERS
1—Reliance all steel jaw crusher 14″x24″ with or without bucket elevators.
1—Telsmith Reduction crusher, 32-B all-Steel 5″ opening.

KILNS OR DRYERS
2—7′ dia. by 60 ft. complete. New condition.

DREDGE
1—6″ ga "ne portable all steel with cutter, spuds, etc.
1—10″ Electric portable sand and gravel dredge.

SCREEN
1—Niagara 3 deck 3′x5′ with 5 H.P. A.C. motor V-Belt drive.

HOIST
1—Sullivan Electric for drag scraper or sluicing, Double drum 60 H.P. A.C. motor.

A. J. O'NEILL
Lansdowne Theatre Bldg., Lansdowne, Pa.
Philadelphia Phones: Madison 7578—7579

CONSOLIDATED
GOOD USED EQUIPMENT

4—4′x8′ Allis-Chalmers Screens, 2-deck, Texrope drive.
2—3′x6′ Niagara Screens, 2-deck, Texrope drive.
2—12x36″, 3′x5′ Jigger Screens, 2-deck.
1—4′x12′ Telsmith, 1-deck, with motor.
8—Tyler Hummer Screens 3x5′, 4x5′, 4x7′; types 31, 37, 39, 33, 60.
2—Tyler V-32 Vibrators.
2—3′x6′, 4′x5′ Sturtevant M.V. Screens, 2-deck.

1—24″x36″ Allis-Chalmers Jaw Crusher.
1—42″x48″ Traylor UNUSED Jaw Crusher.
1—30″x42″ Buchanan, Type C, sectional.
1—42″x60″ Bacon Farrel Crusher.

4—6″& 10″ Allis-Chalmers McCully Crushers.
3—20″, 36″ Allis-Chalmers Superior McCully Crushers.
1—18x16″ Pennsylvania Single Roll Crusher.
1—24x24″ Jeffrey Single Roll Crusher.
3—30x16″, 20x14″ Sturtevant Crushing Rolls.
5—Sturtevant Rotary Fine Crushers; Nos. 0, 1, 1½, 2.

3—Raymond Roller Mills, 3 and 5-roll, high side; 5-roll low side.
4—Raymond Pulverizers; No. 0000, No. 00, No. 1, No. 3.
5—Raymond Imp Mills; Nos. 3, 32, 45, 50, 55.
3—3′, 5′, 10′ Sturtevant Air Separators.
2—30″ Gayco Air Separators.
8—Hardinge Iron Lined Ball Mills; 3′x8″, 4½′x16″, 6′x22″, 8′x22″, 8′x30″.
1—6′x22″ Hardinge Silex Lined Pebble Mill; also 8′x30″ and 8′x72″ unlined mills.
1—7′6″x5′ Unlined Pebble Mill.
1—No. 32 Marcy Ball Mill.
2—6′x12′ Hardinge Iron Lined Rod Mills.
4—5′x26′, 6′x35′, 6′x45′ Class "A" Double Shell Ruggles-Coles Direct Heat Rotary Dryers.
10—Direct Heat Rotary Dryers; 3x30′, 4x30′, 5x50′, 6x45′, 6x50′, 6x60′, 8x60′.
8—Rotary Kilns; 6x60′, 8x110′, 8x125′, 8′6″ & 9′6″x150′.

CONSOLIDATED PRODUCTS COMPANY, INC.
17-19 Park Row - - - - New York, N. Y.
Plant and Shops at Newark, N. J., cover 8 acres of ground.

SPECIALS FOR SALE

Lorain Model 75-B gasoline crawler type 1¼ yard shovel; late model; rebuilt; A-1 condition.
P&H Model 300-B crawler type combination shovel and dragline; Buda Diesel Engine; ⅝ yard shovel; ½ yard drag; 40′ boom; new 1935.
Brownhoist 20 ton capacity eight wheel type locomotive crane; 50′ boom.
Eight 12 yard Western automatic air dump cars; vertical cylinders; steel draft sills.
Ten 6 yard Western standard gauge hand dump cars; steel draft sills.
Three 27 ton American four driver saddle tank steam locomotives.
Baldwin 80 ton 6 wheel switching type locomotive; cylinders 22″x26″; 37,600 lbs. tractive power; new 1922.

HAVE CONSIDERABLE OTHER EQUIPMENT IN STOCK REBUILT READY FOR DELIVERY

Southern Iron and Equipment Co.
PLANT & GEN. OFFICES, ATLANTA, GEORGIA

7″ Newhouse Crusher with 60 HP AC Motor.
13″, 16″, 20″ & 36″ McCully Gyratory.
No. 0 Raymond Automatic Pulverizer.
No. 3 Williams Helix Seal Impact Mill.
¾ yd. Northwest Electric Shovel.
¾ & 1 yd. Northwest Gaso. Cranes.
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25 ton American 8 wheel Loco. Crane.
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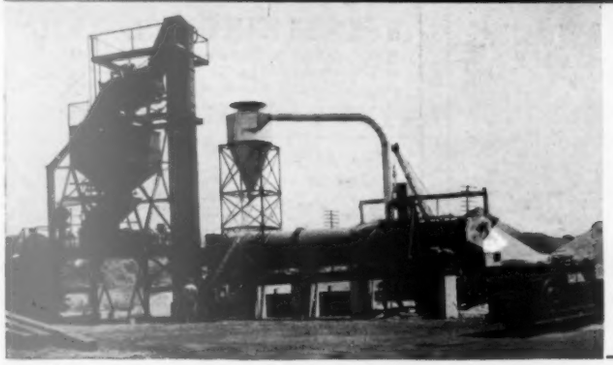

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